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VOLUME V 2 NUMBER 4-6

THE CLINICS

OF

JOHN B. MURPHY, M.D.

A

AT

MERCY HOSPITAL, CHICAGO

Edited by
P. G. Skillern, Jr., M. D.
of Philadelphia

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OF
Volume V JOHN B. MURPHY Number 4

MELANOTIC NEOPLASM IN DIGASTRIC MUSCLE—ABLATION

Summary: Clinical history of patient; comments—physical characters of tumor; black mole a sinister lesion; operation—ablation of tumor with all the posterior belly of digastricus; postoperative comments—examination of operative specimens; pathologic report.

CLINICAL HISTORY OF PATIENT

A FEMALE, forty-four years of age, was admitted to Mercy Hospital April 3, 1916. The family history is negative. Two years ago the patient suffered an attack of tonsillitis.

Six months ago—on October 10, 1915—the patient noticed for the first time a small, nodular swelling in the right side of the neck, just below the ear: so small was this swelling that it was barely perceptible to the touch; there was neither pain nor tenderness. For about one month previous to noticing the tumor the patient had an occasional fleeting dull ache in the right parotid region. At the time the swelling appeared in October she had a bad cold with a cough, but was not incapacitated: she does not know how long she had the cold and cough before noticing the swelling. She coughed for about six weeks, but thought the cough was due to a tickling sensation in her throat. The swelling slowly but gradually increased in size and extended downward. There was no frank pain, and chills and fever were absent.

On December 20, 1915, the patient was attacked by grippe: she coughed a great deal, and one day had fever of 103° F. and a few chills, but no sweats. She was sick for two weeks, but the illness had no apparent effect upon the swelling in the neck.

On January 20, 1916, the tonsils were removed as possible etiologic factors: previous to tonsillectomy the swelling in the neck was aspirated, but black, stringy material alone was obtained. After aspiration the swelling began to enlarge somewhat more rapidly. Shooting pains appeared in the tumor for the first time in the latter part of January: they were not severe, were of short duration, and did not radiate.

For the past twenty or twenty-five years the patient has had a moderate goiter: she attributes the swelling in the region of the right parotid gland to bruising of tissues during the course of chiropractic treatment for the goiter when a strap was placed beneath the chin to make traction upon the neck. These treatments had been carried on for some weeks preceding the manifestation of the tumor. The pain from the manipulation was so severe that she discontinued the treatment quite some time before the tumor appeared.

There is no evidence of facial palsy. The tumor does not interfere with mastication; it does not fluctuate and has not ruptured externally.

The patient does not think that she has lost any weight. Her general health is good. She has a flat, pliable, non-indurated, deeply pigmented mole, about 1.5 cm. in diameter, just behind the right ear, near the base of the mastoid process: she states that it has been present for about five years. This is very superficially situated in the skin, and has not changed in any particular in the last three years.

Examination by Dr. Murphy (*April 3, 1916*).—There is a cystic goiter on the right side, with some enlargement of the left lobe of the thyroid. Above the goiter there is an enlarged lymph-node which is not a part of the goiter, as I interpret it, but a secondary growth from the tumor above, as it feels distinctly separated from the goiter and appears fixed in the position of a parotid tumor. Below the tumor there is another enlarged lymph-node, higher up than the one just mentioned, but close to it, and which may be a continuation of the tumor. Judging from surface appearances the lymph-node should be infected, for the tissues are red and angry, but not infiltrated. Aspiration of the fluid constituent of the tumor yielded thin, grumous fluid, but no blood: on pathologic examination this fluid was found to contain a few squamous (?) epithelial cells, but neither blood-cells nor bacteria. The tumor probably springs from the parotid salivary gland, and not from a lymph-node. If pus should be present, it would account for the enlargement of the lymph-nodes lower down, or the lymph-node may be enlarged from the previous tonsillectomy, or it may be a metastatic lymph-node involvement from the tumor.

COMMENTS

DR. MURPHY (April 4, 1916): In the course of chiropractic treatment for the goiter an external apparatus that was supposed to exert a curative effect upon the bronchocele gave rise to pressure upon the chin, and gave pressure at the angle of the jaw. I never saw a melanotic sarcoma in a muscle the sequence of a trauma and I cannot interpret this as such.

The tumor itself is cystic in character, and apparently sprang from the lower portion of the parotid salivary gland, below the level of the trunk of the facial nerve, which is not as yet encroached upon by it. The grumous material with epithelial cells obtained by aspiration suggests a cyst with a probably malignant (carcinomatous) growth; the malignancy might have resulted from pressure-trauma to the epithelial lined cyst or to the mesoblastic cells.

While the tumor yielded no pus on aspiration, yet it arouses suspicions of an infectious process because of the superficial redness which, however, is now obscured by a coating of iodin. The tumor has been aspirated three different times. The original diagnosis before admission was lymphadenitis secondary to follicular tonsillitis, since the tonsils contained *brie.* It is the fashion now to attribute too many maladies to the tonsils as primary foci, just as in former days so many troubles were attributed to the ovaries. (See Brophy in *Medical Clinics of Chicago*, July, 1916, p. 135.)

I take it that the tumor, springing from the lower pole of the parotid salivary gland, has displaced the facial nerve upward; and although the patient has been mentally prepared for facial palsy as a sequence of the operation, yet I hope to be able to ablate the tumor while sparing the nerve.

The patient has also a black mole on her face, but it bears no relation to this tumor. A black mole is always a sinister lesion, and one that is to be regarded with distrust, so that the first thing I want to do is to remove it. A black mole must be handled with wholesome respect, for one dares not traumatize it with impunity, either by accident or design: I therefore shall go wide of it into healthy tissue when removing it

OPERATION

[Through an incision extending from just below the ear around the angle of the jaw and to the upper pole of the thyroid gland, exposing the posterior belly of the digastric muscle at the lower angle, an acutely edematous, bean-sized mass was encountered, which resembled an acutely inflamed lymph-node, and which was not broken down in the center. Then on freeing the larger tumor in an upward direction it was found resting within the posterior belly of the digastric muscle, and to be wholly encapsulated by the muscle. The tumor was ablated together with its capsule, and all the posterior belly of the digastricus. This at its largest point was about as thick as one's thumb and about 2 inches long. Another tumor, cystic in nature, was removed from the vicinity of the superior pole of the thyroid gland. The seventh, tenth, eleventh, and twelfth cranial nerves and the external carotid artery were exposed in the course of the dissection. The seventh nerve alone was tested and gave a positive response to the faradic current. The operative field was swabbed with 5 per cent. phenol, and the wound closed without drainage. The black mole was also ablated.]

POSTOPERATIVE COMMENTS

Macroscopic examination of the large tumor reveals pigmentation, which has resulted from either hemorrhagic deposit from the several aspirations, or the presence of a melanotic neoplasm: if it is a metastatic growth from the black mole we removed from the skin, it will classify as a melanotic carcinoma. The second small specimen looks like an encapsulated colloid goiter, and contains no pigment. A melanotic sarcoma of this muscle I have never seen before and primary melanotic sarcomata of the muscles are extremely rare.

Pathologic Report (Dr. Albert H. Baugher).—The tumor consists of an irregular mass of tissue containing three distinct portions, which are held firmly together by a fibrous band 2.5 cm. in width and 1 cm. in length: this band is continuous with each of the three portions, and enters into the formation of their capsules.

The largest portion consists of a somewhat spheric mass, measuring 3.8 x 5.1 cm.; it is completely surrounded by a capsule which varies in thickness up to 2 mm. The tumor itself is very friable for the most part, and has a jet black color. The torn edges of this part of the tumor present numerous threads or hair-like projections, which can be seen distinctly with the unaided eye.

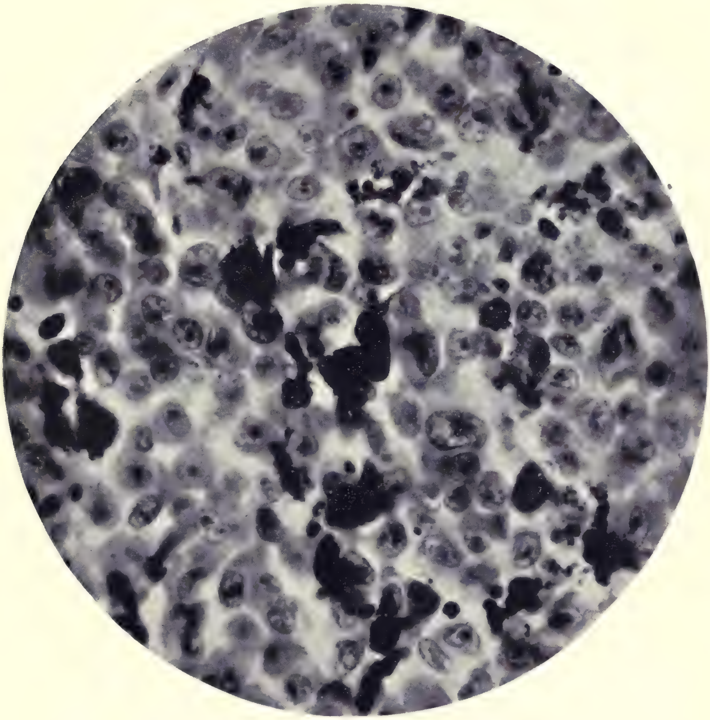

Fig. 111.—Shows character of large round cells: dark areas indicate melanin. This portion of tumor contains relatively a very small amount of melanin. (× 500.)

The second element consists of a mass measuring 3.1 x 2.2 x 2.2 cm. and is brownish-black in appearance. It is covered by a capsule of uniform thickness (2 mm.).

The third element consists of a strand of fibrous tissue, 3.8 x 1.2 x 0.6 cm. in length, containing numerous nodular masses, the largest of which measures less than 7 mm. in diameter. One of these small nodules has a slightly brownish appearance.

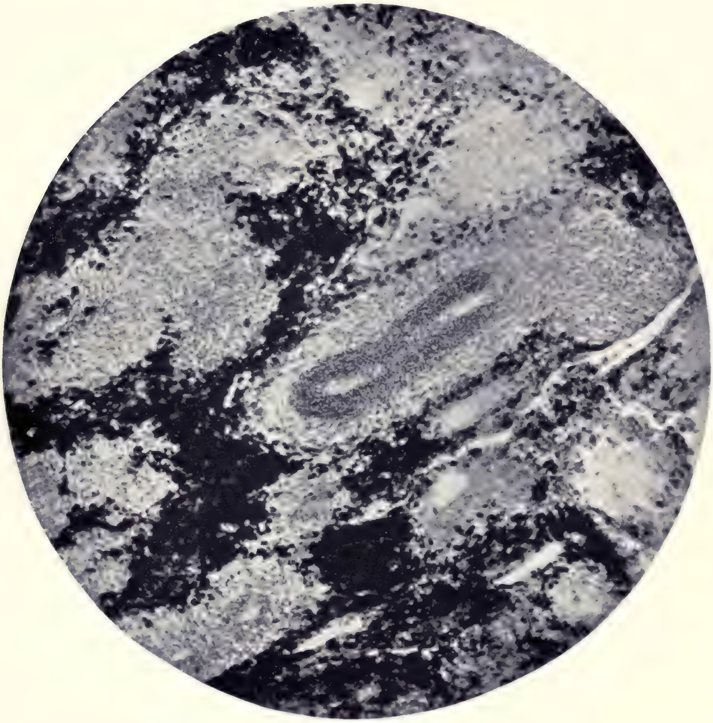

Fig. 112.—Dense melanin deposits with almost complete absence of tumor cells, and a blood-vessel showing perithelial type of proliferation of cells with beginning necrosis of the outer layers. The light areas show varying degrees of necrobiosis. (× 60.)

The predominating cell in these tumors is a large round cell (Fig. 111): oval and spindle cells also are found. Melanin is present, both within the cells and outside of them, and in places is very dense. There are areas of necrosis which at times involve entire tumor-cells. A small amount of connective tissue is present, and blood-vessels in parts of the tumor are fairly frequent (Fig. 112).

A distinct perithelial type of growth is observed throughout the tumor, and is especially well marked in the areas of infiltration of cells about the vascular spaces.

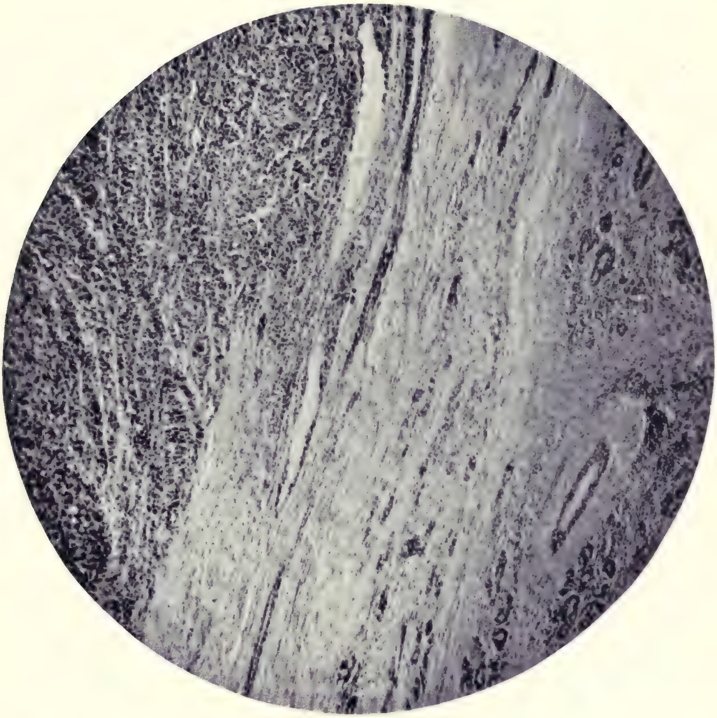

Fig. 113.—Note on the right the inner two-thirds of the capsule of the largest tumor, with a vascular area showing the character of proliferation and infiltration of the tumor cells. At the inner margin of the capsule lymph-channels with proliferation can also be seen, of which one penetrates the tumor cells, and at this point the tumor cells can be distinctly seen invading the capsule. Main body of tumor is on left. (× 70.)

The capsule is invaded by the tumor cells, particularly in its most vascular areas. Some of the lymph-spaces and small capillaries are occluded by this proliferative process (Fig. 113).

Apparently this tumor is strictly of endothelial origin.

The following specimens accompanied the above-described tumor:

(1) A piece of fibrous tissue 1 cm. in diameter and as thick as an ordinary sheet of paper: examination of a frozen section revealed tendinous tissue.

(2) An encapsulated mass 1.5 x 1 x 1 cm., which, on microscopic examination, proved to be a fetal adenoma of the thyroid.

(3) A piece of skin 2 x 2 cm., in the center of which was a pigmented mole 7 mm. in diameter. Histologic examination revealed a deeply pigmented layer just beneath the corium with a few spindle-cells in the immediate vicinity. Mole-cells were also found in some of the deeper layers, but exhibited no evidence of special proliferative activity.

In a paper entitled "Melano-epithelioma," which is based upon a report of 70 cases from the Mayo Clinic, Broders and MacCarty (*Surg., Gynec. and Obst.*, July, 1916, 28–32) draw the following conclusions. (Italics ours.)

"1. The so-called 'melanosarcoma' should be called properly a melano-epithelioma when such a condition arises in the skin.

"2. The condition arises as a migratory hyperplasia of the basal (regenerative or germinative) layer of the skin and invades the subcutaneous tissues and distant organs as pigmented and non-pigmented oval, spheric, or spindle cells, all of which cells are frequently found in the same specimen or even in the same microscopic slide.

"3. The evolution of such neoplasmata in regenerative cells corresponds to the evolution of cancer in the skin, mammary gland, prostatic gland, and stomach.

"4. The alveolar arrangement of cells in this series shows no evidence of any relation to vascular endothelium.

"5. The condition is one of middle life, although it may be found from childhood to old age.

"6. An attempt at determination of the exact duration of the condition from its onset to a fatal termination has failed in this series.

"7. There is no specific region of the skin which seems especially predisposed to the development of melano-epitheliomata unless it is on the lower extremities, which in this series form the greatest frequency of location.

"8. *Nevi certainly predispose to the development of the condition.*

"9. Metastasis is usually to the regional lymph-nodes.

"10. *From an economic or practical standpoint melano-epitheliomata which arise in the skin have a high mortality.*

"11. Melano-epitheliomata or melanosarcomata arising in the eye have a much better prognosis than melano-epitheliomata arising in the skin.

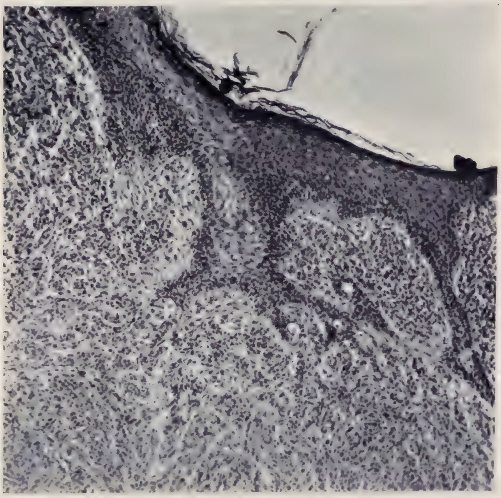

Fig. 114.—A section of a mole showing the direct connection between the stratum germinativum and the subepithelial cells which are characteristic of moles (Broders and MacCarty).

"12. *From a therapeutic standpoint the pathologic history of melano-epithelioma clearly points to the necessity of an early diagnosis and a radical removal of the primary lesion and regional lymph-nodes.*

"13. *From a prophylactic standpoint pigmented areas of skin, such as warts and nevi, should be removed when these are in locations which are or have been subjected to injury*" (Figs. 114–120).

A case of "Melanosarcoma of Shoulder and Nodes About Shoulder: Well After Incomplete Operation," together with illustrations and description of pathologic specimen, was reported by Dr. Frank S. Mathews (*Annals of Surgery*, July, 1915, 115–17). In the discussion which followed Dr. Moschcowitz recalled a young woman with a pigmented tumor the size of the end of the finger just above the mons veneris: though it had ex-

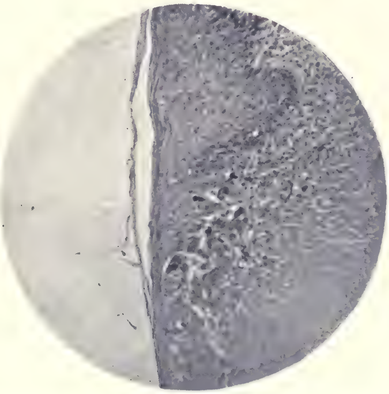

Fig. 115.—Photomicrograph of an early migration of the malignant cells of the stratum germinativum in the skin of the right labium (Broders and MacCarty).

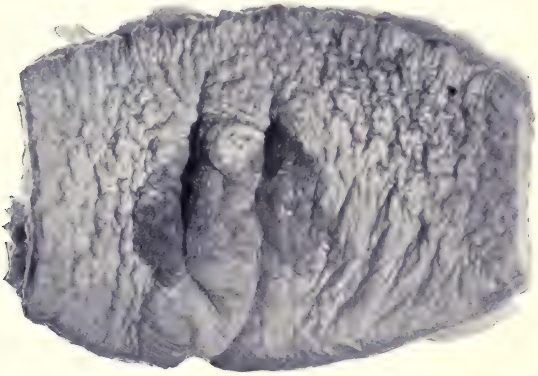

Fig. 116.—A flat pigmented mole upon the inner side of right leg, metastasis in the right inguinal glands; death within a year from operation (Broders and MacCarty).

isted for years without giving trouble, just before admission to hospital it became ulcerated. "It was excised widely, and after the usual laboratory argument as to whether it was melanocarcinoma or sarcoma, it was decided in favor of the former." Recurrences of the same type of tumor, thoroughly pigmented, occurred later in the right femoral region.

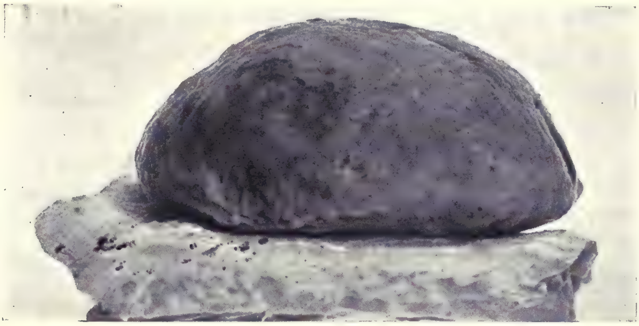

Fig. 117.—An elevated, almost pedunculated, pigmented malignant neoplasm upon the left internal malleolus (Broders and MacCarty).

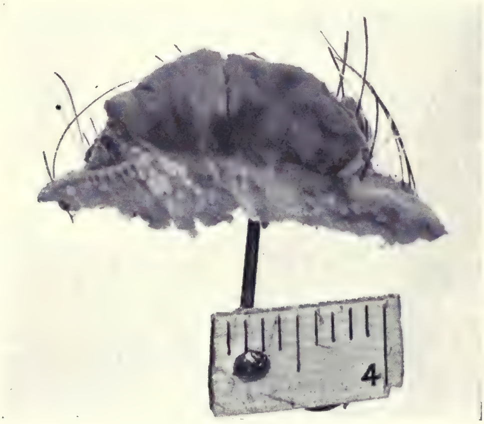

Fig. 118.—Cross-section through a malignant pigmented hair mole upon the right cheek. The neoplasm has not extended visibly into the subcutaneous tissues (Broders and MacCarty).

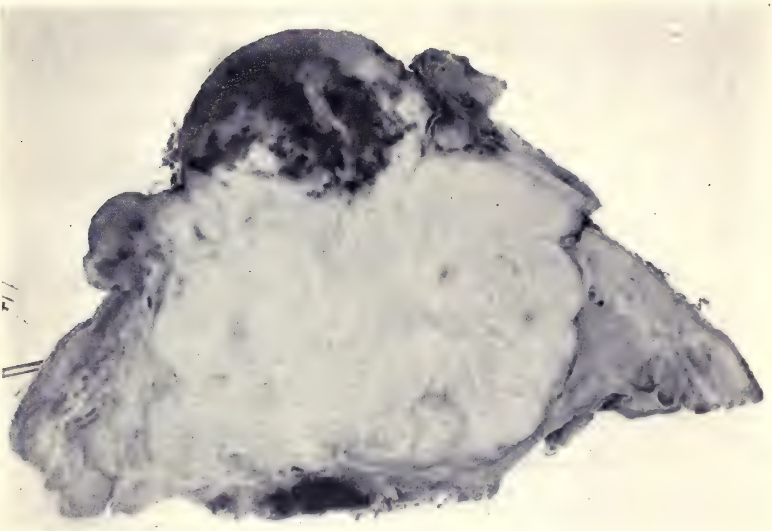

Fig. 119.—Cross-section showing the extension of a growth from a pigmented mole into the subcutaneous tissue. The growth in the subcutaneous tissue lacks pigment; location, right leg just below the knee (Broders and MacCarty).

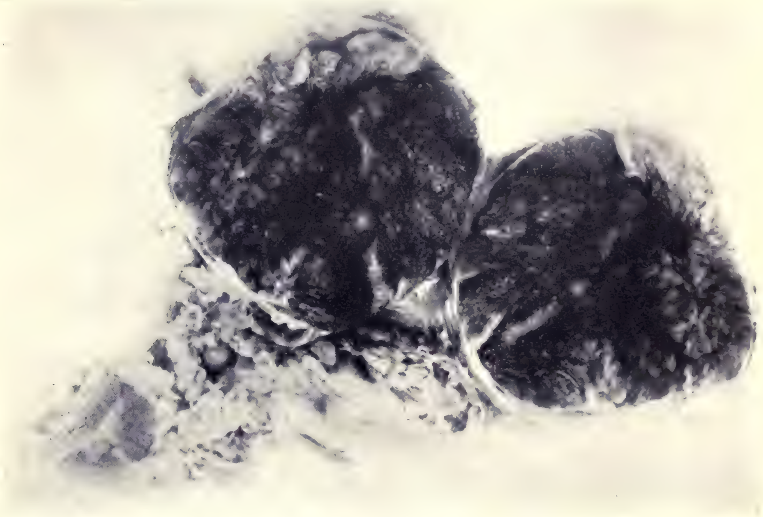

Fig. 120.—Metastatic growth of the left axillary glands (Broders and MacCarty).

Dr. Kammerer recalled a case of melanotic tumor of the labium majus, which he had removed many years ago, where no enlarged nodes were present in the groin. He had followed the case for a year and a half after operation, with no recurrence. He also referred to a case in which, a short time after extirpation, metastatic deposits appeared in the lymph-nodes and the skin of the entire body (see comments on case of "Multiple Sarcomata of Skin," published in the CLINICS, vol. v, June, 1916, 379-384).

Dr. Pool referred to a case of mammary recurrence five years after extirpation of the eyeball for melanosarcoma. On looking up the literature of the subject he found that in a large proportion of the cases of melanosarcoma originating in the uveal tract metastatic growths are of late occurrence, often from five to seven years after the enucleation of the eye for the original growth; also that when metastases become evident their growth is usually extremely rapid. The mammary growth had appeared only a few months before the radical operation, but in spite of this general metastases developed and the patient died in six months.

A pigmented type of sarcoma of muscle is very rare, but cases have been reported by Mallory and Kaufmann in a very few words. There is no reported case of melanotic sarcoma of the digastricus that I know of. Preceding the operation I felt that it was a tumor of the parotid, and it was only when I exposed the lower pole of the parotid that I found the tumor was situated in the digastricus and recognized its true significance. This was a most interesting tumor, and its subsequent clinical course will be watched closely.

Postscript (May 3, 1916).—Wound healed by primary union. There has been no return of tumor to date. *X*-ray treatments with Coolidge tube were given after the operation.

MIXED TUMOR OF PAROTID SALIVARY GLAND—ABLATION

Summary: **Clinical history of patient, including previous operation; comments—avoidance of injury to facial nerve; result of pathologic examination; mixed tumors of parotid not necessarily malignant; chronicity of the lesion is typical; operation—ablation of tumor; postoperative result.**

CLINICAL HISTORY OF PATIENT

A FEMALE, fifty-two years of age, was admitted to Mercy Hospital February 19, 1913.

For the past seven years there has been a "swelling" just above the level of the angle and behind the ramus of the jaw on the left side. In the beginning this swelling was very small—merely a little round spot—and it remained stationary in size for years. When pressed upon it was slightly tender, but there was never any severe pain in it.

About one year ago the tumor began to enlarge, and it has grown steadily until it reached its present size. It has not become any more tender. The most sensitive spot is on the upper part.

The patient has had two small growths—she calls them wens—removed from the skin of the abdomen and several from the scalp. These tumors "broke down" before they were removed: they were hard in consistence and about the size of a pea, but were not tender. They occurred during the course of the past fifteen years: the last one was removed last fall.

The patient has never had any trouble with her teeth. There has never been any enlargement of lymph-nodes. Aside from mumps in childhood, her past history is negative.

On February 20, 1913, the patient was operated upon by Dr. Murphy: through a small incision over the growth, the latter was enucleated. While the tumor had broken through its capsule in two places, yet the surrounding tissues were not infiltrated: in size the tumor equaled a marble.

About the middle of June, 1915, there was found upon examination evidence of return of the growth. About a month later the patient noticed a small swelling upon the *right* side of the face, just in front of the ear. Ever since the first operation the right side of the face in the region of the parotid salivary gland has been tender to touch, and the patient has had sharp, shooting pains lasting one or two minutes, regardless of the time of day; damp or rainy weather causes the attacks of pain to be more frequent. These attacks of pain occur almost daily, and a whole week never elapses without pain.

For three months following the operation *x*-ray treatments were administered, and again from December 15, 1913, to February 1, 1914, but none has been given since.

On November 2, 1915, Dr. Murphy found upon examination some thickening of the parotid gland higher up; there was no thickening at the site of the previous operation. The patient was advised to submit herself to operation the following week, after having had two *x*-ray treatments.

On November 8, 1915, the patient returned to hospital for the operation.

COMMENTS

Dr. Murphy (November 9, 1915): At the first operation we succeeded in ablating the tumor without injuring the filaments from the pes anserinus, so that no muscle of expression was paralyzed. Pathologic examination of the specimen removed revealed mixed tumor of the parotid: these growths may not appear to be malignant microscopically, but clinically often assume a very malignant character, and *vice versa*. The history of seven years' duration is typic for these cases.

Since the operation the patient has never been free from sensitiveness to pressure over the scar, but has been free from other symptoms. When I saw her in May, 1914, there was neither pain nor discomfort.

OPERATION

[Through a small incision an encapsulated, pliable tumor was ablated. On testing the nerve with the faradic current a positive response was obtained. A subdermal suture of catgut was introduced, and the skin-edges were apposed with horsehair stitches.]

POSTOPERATIVE COMMENTS

There is no settled or accepted opinion on the pathology of mixed tumors of the parotid gland. There are often found spindle cells, cartilage, myxomatous tissue, glandular acini, fibrous tissue and endothelial cells all in the same tumor, and occasionally bone. Many believe that they are branchiomata or embryonal rests,* as they are made up of epithelial and connective-tissue structures, and the epithelial again may be of columnar and pavement variety. About a fourth of the number is clinically malignant. In the great majority of the cases it is impossible to tell from the microscopic findings what course the tumor will take. That is why one should be careful to remove all the tumor, including its capsule. The effect of *x*-rays and radium in this class of tumors is still questionable.

Pathologic Report.—Parotid tumor similar to a carcinoma.

Postscript.—The patient made an uneventful recovery. She has had *x*-ray treatments from the time of the operation up to the time she was last seen, which was on January 12, 1916. Her face is in perfect condition, and no paralysis resulted from the operation.

June 16, 1916.—There is no evidence of return of the tumor.

(A case of "Tumor of the Parotid Salivary Gland" was published in Vol. IV, August, 1915, 583–7. For table of tumors of the salivary glands consult Vol. IV, December, 1915, 1066.)

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* McKenty terms these mixed tumors "first or second arch tumors."

BONY ANKYLOSIS OF TEMPOROMANDIBULAR JOINT—ARTHROPLASTY (THREE CASES). TALK ON ANKYLOSIS OF THE MANDIBLE

Summary: Case I.—Clinical history of patient; comments—unreliability of skiagrams in this condition; obscurity of lesion; importance of avoiding injury to facial nerve; operation—findings; method of preventing necrotization of flap.

Case II.—Clinical history of patient; comments—difficulty of dealing with ankylosis from extra-articular fixation; method of distinguishing side involved; accidents attending operation—injury to internal maxillary artery—respiratory block—injury to cranial contents; operation—findings; postoperative comments. Talk on ankylosis of mandible.

Case III.—Clinical history of patient; comments—cause of recurrence a trauma from a horse-kick; operation—neoplastic bone removed—interposition of free transplant of fascia lata.

CLINICAL HISTORY OF PATIENT

A MALE, twenty-two years of age, was admitted to Mercy Hospital May 19, 1915.

When eleven years of age the patient fell from a hay mound to a hayrack,—a distance of 18 feet,—striking upon his chin: he was not rendered unconscious, and there was no bleeding from ear or nose; both sides of the mandible were luxated. A physician reduced the luxation on the right side, but that on the left side could not be reduced, owing probably to a complicating fracture: a molded plaster dressing was applied with the mouth closed, and a tooth was extracted for the passage of a feeding-tube. At the end of ten days the plaster dressing was removed: the mandibular joints were found very painful and tender, and the patient could open his mouth but ¾ of an inch; he was advised not to move his jaw much.

Ever since the accident was received the left temporomandibular joint has been painful at times, but the right side has given no trouble; and the patient has had to feed himself by pushing solid food through the small opening between the teeth: during the past year this opening has been gradually diminishing, and at present the patient is able to open his mouth to the extent of only ¼ of an inch. His general health is good.

Examination of the right temporomandibular joint reveals a normal conformation but no motion; on the left side, however, there is a marked deformity which suggests a fracture of the mandible: this deformity consists of elevation of both the zygoma and the condyloid process, with a bony mass extending downward from the zygoma for ¾ of an inch, while below this bony mass there is a pronounced depression.

COMMENTS

Dr. Murphy (May 22, 1915): I have never seen a case which presented the same characters as this one. The lesion was a bilateral luxation of the mandible, that on the right side alone having been reduced, while on the left side there is a marked deformity about the condyloid process which suggest fracture of the posterior portion of the zygoma. Skiagrams of the temporomandibular joint do not shed much light upon the nature and extent of an injury to the joint. Owing to the presence of the deformity we anticipate obscuring of the normal anatomic landmarks, but nevertheless we shall expose the joint through the typical arthroplasty incision. In planning the incision for approach to the joint one should select that route which least damages the temporal branches of the facial nerve, which supply the anterior belly of the occipitofrontalis, the corrugator supercilii, and the orbicularis palpebrarum: if these muscles should be paralyzed the patient would not be able to wrinkle his forehead, knit his brows, or close his eyelids on the side injured. Bleeding is to be anticipated from branches of the anterior division of the superficial temporal artery. Another consideration in planning the incision is to leave as much of the resulting scar as is possible hidden by the hairy scalp.

OPERATION

[The operation conformed to the type described in the talk below. The bony mass encountered during the examination was found to be 1¼ inches in breadth, and to have been due to a vertical fracture of the condyloid process with outward displacement of the external portion of the head and union of the latter to the posterior portion of the zygoma. This deforming external portion of the head was removed and one-half inch of the neck resected, the interposing temporal fascia-fat flap inserted, and the wound closed.] . . . In order to prevent necrotization of the flap during the process of repair we must oppose the upward pull of the temporal and masseter muscles by inserting our wedge-shaped wood block between the teeth on the left side: we shall not stretch apart the right temporomandibular joint at the present time, for such a stretching would bring too much pressure to bear upon the interposed flap on the left side. These are small details, but essential ones in obtaining a good result.

CASE II

CLINICAL HISTORY OF PATIENT

A FEMALE, eleven years of age, was admitted to Mercy Hospital September 23, 1915.

Six years previously the patient suffered an attack of typhoid fever. In the third week of the disease, while delirious from high fever, she pulled three teeth out of the left maxilla: soon a swelling appeared before the left ear, and later a sequestrum was removed from the maxilla, whereupon the swelling subsided. The duration of the attack of typhoid fever was eight weeks.

During the next five months it was noticed that the motion of the jaw was gradually becoming more and more limited, and three years ago the mouth was closed and could scarcely be opened. Within the past three years the permanent teeth have erupted, but the jaw has remained fixed and immovable.

Examination by Dr. Murphy (September 23, 1915).—When the patient attempts to open her jaws there is a deviation of $\frac{1}{100}$ of an inch to the left. The right side of the face is flattened, but there is practically no flattening on the left side, nor is there any palpable cicatricial contraction, notwithstanding the history of infective osteomyelitis of the maxilla with sequestrum-formation. The distance from the symphysis menti to the tubercle of the zygoma on the right side is 5 inches, and on the left, 4½ inches.

COMMENTS

Dr. Murphy (September 25, 1915): The clinical history is suggestive of ankylosis by fibrous fixation between the alveolar processes—the most difficult of all types of mandibular ankylosis to overcome: in this type resection of the neck of the mandible is futile, for the operation should be performed within the mouth cavity. Since the patient cannot open the mouth $\frac{1}{100}$ of an inch, even, there is trouble ahead if the ankylosis be of this type: we hope, therefore, that the joint itself is the site of the ankylosis, from direct extension of the infection backward.

Physical examination reveals evidence (½ inch of shortening) of retarded growth of the left side of the mandible: this leads us to believe that we are dealing with bony ankylosis. It is most difficult in these cases to determine which side is ankylosed, but when this patient tries to open her mouth the mandible deviates to the left side for $\frac{1}{100}$ of an inch: this is due to the fact that the condyloid process on the sound (right) side travels forward and mounts upon the eminentia articularis, while on the involved (left) side there is only a slight twisting of the ramus on its long axis. On the right side the face is flattened and deformed, while on the left it is full, round, and apparently normal: this situation indicates that the ankylosis is on the left side—a diagnostic point which we brought out in our original article. On the right side there is pronounced voluntary muscular contraction, while on the left there is practically none.

In children mandibular infection may spread to the zygomatic fossa and on subsiding leave the legacy of a large mass of cicatricial tissue, which perhaps binds the coronoid process to the infratemporal crest—a very difficult situation to deal with.

In resecting the neck of the mandible the close relation of blood-vessels to its deep (internal) surface must be borne in mind: these vessels are the internal maxillary artery and vein, accompanied by the auriculotemporal nerve: they course between the sphenomandibular ligament and the neck of the mandible, separated from the latter by the thin, internal portion of the articular capsule, and are to be avoided by clearing the bone subcapsularly and then protected from injury during division of the bone by interposing two curved periosteal elevators between the latter and the vessels and nerve; owing to distortions produced by cicatricial tissue, however, the artery may be inadvertently wounded—an accident that demands ligation of the parent trunk, the external carotid, and one which may be anticipated by performing this ligation as a precautionary step, as we performed it in two of our cases.

Another accident which may occur during the course of the oral operation is that of respiratory block from aspiration of blood-clot: owing to the tight closure of the jaws it is difficult to prevent this accident, and immediate tracheotomy may be necessary. In one such case we succeeded in removing the soft clot from the trachea by sucking it into a soft catheter. To maintain the patency of the tracheotomy orifice in case the conventional tracheotomy tube is not to hand, one may use a soft-rubber catheter, the tip of a stethoscope, the nozzle of a fountain syringe, or two silk ligatures as tractors.

Still another accident is that of injuring the meninges at the base of the brain by perforating the dome of the articular portion of the glenoid cavity, where the bone is so thin that it is translucent: this accident may occur during an attempt to remove the ankylosed mandibular head from the fossa, and is to be avoided by not disturbing the head and conceding it as the property of the temporal bone, which so jealously guards it; instead, a pseudarthrosis should be established at the site of the resected neck, between the ascending ramus and the fused head.

OPERATION

[The operation conformed to the type described in the talk below. The bony ankylosis was found to extend forward to the coronoid process and upward to the infratemporal crest: in order to obtain better exposure the lower portion of the zygoma was resected; with a curved chisel the hyperplastic bone was removed, and the interposing temporal fascia-fat flap was inserted; the operative wound was closed without the use of drainage.]

POSTOPERATIVE COMMENTS

After the bone was entirely freed we could see the internal maxillary artery clearly pulsating in the bed of the resected neck. Upon releasing the mandible from its bony fetters I asked Sister if the jaws could be opened: she replied that they could not be opened very much; that was all one needed to know in estimating the practical result of the bone-removal, for the jaws could not be separated at all previous to operation.

After inserting the interposing flap we did not attempt to suture its tip to the capsular bed of the mandibular neck for fear of perforating the internal maxillary artery with the needle, as occurred in one of our early cases; in fact, this step is unnecessary: it suffices to tack the base of the flap to nearby tissues. This is our twenty-ninth case of operation for ankylosis of the mandible, and so far we have been so fortunate as to have 100 per cent. successes.

Postscript.—There was healing *per primam* and voluntary motion was begun on the twenty-first day.

[Cases of ankylosis of the mandible have been previously published in the Clinics as follows: Vol. I, December, 1912, 905–918; Vol. II, June, 1913, 405–411—extra-articular cicatricial-fixation type: use of mucous membrane flaps; August, 1913, 659–664; Vol. III, June, 1914, 611–616—full-page illustrations of steps of operation.]

CASE III

CLINICAL HISTORY OF PATIENT

A male, eighteen years of age, was readmitted to Mercy Hospital December 13, 1915. On September 7, 1912, he was operated upon by Dr. Murphy for ankylosis of the right temporomandibular joint. The condyloid process was resected, and a bony mass, which extended from the condyloid to the coronoid process and zygoma, was removed. A flap of temporal fascia and fat was interposed in the usual manner. (See full report of case in Vol. I, December, 1912, 905–918.) The left joint was normal.

After the operation the range of motion of the jaw increased until, by the end of the first year, the patient was able to open his mouth to the fullest extent. As time went on the mandible straightened itself out until it was no longer drawn over to the right.

In January, 1915, the patient noticed that he could not open his mouth as widely as before. The range of motion gradually became diminished until, by June, 1915, there was scarcely any motion left.

There is no history of a primary source of reinfection of the joint: in fact, there has been no pain, swelling, or soreness in the joint at all since the time of the operation. There is no history of an injury. (See *nota bene* on p. 577.)

COMMENTS

Dr. Murphy (December 16, 1915): Not so much as $\frac{1}{100}$ inch of motion is discernible here (Fig. 121), and I am unable to avail myself of the test to determine which side is involved in the present ankylosis. The patient did well after the operation in 1912: here is a photograph showing him with a large apple in his mouth; for two years and five months after operation there was perfect motion in the jaw. In the absence of a history of injury or infection I do not know how to explain an ankylosis on the previously operated side of the jaw after that long period of time. Metastatic infection could not have taken place into the pseudarthrosis as there is no synovial membrane there and particularly no subsynovial capillaries for the arrest of septic emboli, as takes place in metastatic arthritis. Without trauma there could be no condition to encourage ankylosis two and one-half years after a pseudarthrosis had been established with such perfect motility of the jaw. That is why at this time I am unable to estimate which side is involved in the present ankylosis, and the skiagram does not give us any assistance. We shall see what the operation will disclose, and we shall go in primarily at the site of the former operation. We have had two cases which closed up *immediately* after operation, but we allowed both to leave hospital three weeks after operation, and the parents did not see to it that the jaws were blocked properly: both cases were reoperated upon with excellent results.

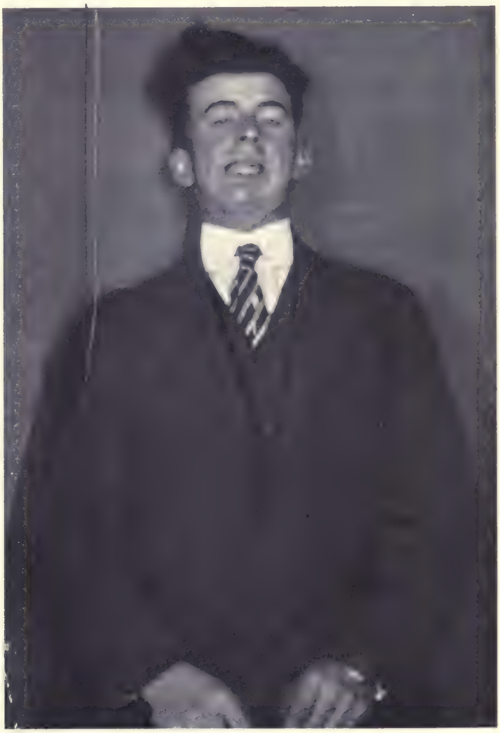

Fig. 121.—Shows fullest extent to which mouth could be opened. (Photo taken December 4, 1915.)

In this patient's case there are many things to consider. In the first place, Which side is ankylosed? What is the type of ankylosis? How much of an area is involved? Will there be found a bony mass 1½ inches in width extending forward beneath the zygoma?

OPERATION

[After exposure of the right side of the mandible (the side previously operated upon) by the method described above there was found a dense mass of neoplastic bone extending from the tip of the coronoid process to the base of the zygoma, and to the under surface of the temporal bone. A section ½ inch wide was removed out of this mass of bone, which was ⅝ inch thick, permitting the jaw to be opened ½ inch.] I was able to use the curved periosteotomes, which gave me security in the procedure. [The temporal fascia having been utilized for the previous operation, it was necessary to employ a piece of fascia lata as material for the interposing flap. This was inserted to the full depth and completely filled the space from which the bone had been removed.]

POSTOPERATIVE COMMENTS

Completely detached fascia and fat flaps were used by me almost a decade ago, but I found in weight-bearing joints that too much cicatricial tissue formed in the transplant, limitation of motion occurred, and in one case a bony ankylosis took place. As this is not a weight-bearing joint, I feel we are justified in expecting the fascia and fat to supply a permanent, sufficiently flexible tissue to admit of mobility of the jaw.

The history of this case does not tally with the operative findings, which show an extensive mass of ossified connective tissue, such as is not at all uncommon after trauma or infection. I do not think the lad is telling a straight story.

[N. B.—Upon being questioned after operation the patient admitted that he had been kicked by a horse just before the return of the ankylosis. This trauma clears up the etiology of the return of the ankylosis. The healing took place *per primam.*]

TALK ON ANKYLOSIS OF THE MANDIBLE

Ankylosis of the mandible may be divided into—(1) the intra-articular fibrous and osseous and (2) the extra-articular cicatricial varieties; the latter may also be termed the interalveolar or cheek cicatricial fixation, the result of ulceration in the mouth and infections in the zygomatic fossa.

The commonest type of ankylosis is the bony. It may be due to:

1. Extension of infection from the middle ear.

2. Mandibular osteomyelitis extending to the glenoid cavity.

3. Metastasis from foci of infection elsewhere in the body, or part of a general metastatic arthritis.

4. Traumatism transmitted from a blow or fall upon the chin. Trauma is the etiologic factor in nearly 50 per cent. of the cases, and this variety of trauma is the commonest form of injury.

Ankylosis may involve the head of the mandible alone, or extend across the sigmoid notch to the coronoid process until the mandible is welded to both infratemporal crest and lower border of zygoma.

When disease is the etiologic factor, mandibular ankylosis results most frequently from extension of infective otitis media; the abscess may burrow forward and rupture into the glenoid cavity or reach the latter by passing over the base of the zygoma; or it may burrow forward into the temporal and zygomatic fossæ, producing extensive phlegmonous myositis with subsequent cicatricial contraction and fixation. This last situation may be equally caused by spread of infection from the scalp or cranium and from penetrating wounds of the mouth or cheek.

Extra-articular cicatricial fixation is caused by ulceration of the mucous membrane of the cheek from infective dento-alveolitis and infectious diseases, as scarlatina, typhoid fever, measles (noma), diphtheria, variola, pneumonia, syphilis, etc.

The **differential diagnosis** as to which side is involved is often extremely difficult. When the ankylosis is bony, there is complete fixation of the jaw; when fibrous, there is some motion—the extent depending upon the degree of joint-involvement. In the extra-articular variety there is always some motion; while in the intra-articular there is sometimes a little lateral motion on the unaffected side, from $\frac{1}{100}$ to $\frac{1}{60}$ of an inch on forcible opening of the mouth—a point in diagnosis which is well worth remembering.

I have learned by clinical observation and experience that a diagnosis of the side involved can be made accurately—when one side alone is affected, and if the condition occurred early in life—by noting the deviation and contrast-formation of the two sides of the face: on the side of ankylosis the face is full, round, and apparently normal in contour, while on the opposite (unaffected) side it is flattened and deformed. The chin is always more or less retracted and deviates toward the ankylosed side. If the ankylosis occurs after the patient has attained full growth, this deviation is but slight in degree; whereas if it occurs in infants or children, the deviation and retraction are marked and increase in degree as the patient grows older. The earlier the ankylosis has occurred in life, the greater the deformity of the face. Fixation of the joint interferes with proper development of the mandible. The epiphysis of the latter is the means through which the ramus grows in length: this growth is arrested by ossification across the epiphyseal line before the normal time for ossification, which time is the fifteenth year; all the other five centers of ossification are united by bony formation before birth. The absence of function of the jaw is undoubtedly a contributing factor to its aplasic state: when ankylosis is of recent development, there is not much deformity.

The **physical findings** in these cases are the following:

1. Flattening of the jaw on the unaffected side, most pronounced, at the chin.

2. When the patient attempts to open his mouth, the teeth move from $\frac{1}{100}$ to $\frac{1}{60}$ of an inch downward and deviate slightly toward the ankylosed side, the cause of which has been given above.

3. A sliding motion on the unaffected side, which may be felt by the palpating fingers: the muscular activity on this side is very much greater on efforts at opening the mouth than on the ankylosed side.

4. Greater atrophy of muscles on the ankylosed than on the unaffected side.

In but one case of a series of nine cases of intra-articular temporomandibular ankylosis was there failure to diagnose the side affected, and in that case I was entirely misled by the history to hand; all data, including the information obtained from the mother, pointed to the left side as the one involved in the original lesion—a middle-ear abscess which had been opened and drained, when, as a matter of fact, ankylosis affected the right side: therefore, the history could not have been correct. That case taught me to base the diagnosis on the physical findings, rather than on the history.

As to the **technic of operation,** in all cases of intra-articular ankylosis of the mandible I have performed typical and uniform arthroplasty, with results that justify my advocating this exact technic for these cases. The technic of this operation is not difficult, but it must be exact in its details in order to secure good results. I have employed the pedicled flap as the interposing material: it consists of fat and the aponeurosis of the temporal muscle, and sometimes includes a few muscle-fibers.

In my earlier operations I fixed the tip of the flap to the connective tissue and internal portion of the capsule: later, I abandoned this procedure, and now I fix the flap at the basal angles alone, thereby avoiding injury to the internal maxillary artery. This flap is of the same shape and material as that used in my operations in 1902, but at that time I brought the flap under the zygoma down into the joint, while now I turn it over the zygoma into the joint.

At first I exposed the joint by a perpendicular incision just in front of the ear, extending from 1½ inches above the zygoma in the hair-line downward to the lower border of the zygoma; later, I modified this incision by curving it slightly forward on the temple at its upper extremity, and then I adopted an L-shaped incision (the one I make now), the perpendicular portion of which comes down to the upper border of the zygoma and then extends forward along its upper margin from ½ to ¾ of an inch. That is a very satisfactory incision, and one which leaves only a slight scar—most of it being hidden in the hair. It gives better access to the joint than does the perpendicular incision, because in some of my cases of bony ankylosis the ankylosis extended forward on the zygoma from the glenoid to the coronoid process.

The perpendicular incision is made for the purpose of securing the fat and fascia of the temporal muscle.

I have divided the ankylosis by means of chisels, Gigli saw, and an olive-tipped dental bur driven by an electric motor: the last is much more rapid, but, on the whole, not so satisfactory, I believe, as the chisel. It is needless to point out that in the use of both the chisel and the bur the greatest caution is required, because of the close proximity of the brain, which is separated from the head of the mandible by a very thin, transparent plate of bone alone.

As to the **details of the operation,** after the incision has been made the edges of the wound are retracted, the lower edge being displaced downward over the lower border of the zygoma, in order to give good exposure of the joint; then the tissues are separated with a special curved periosteal elevator all around the anterior surface of the line of union and further separated with a similar instrument around the posterior surface. When the bone is laid bare, the two instruments are passed behind its neck,—one from each side,—so that when they are in place they completely encircle the neck behind, close to the head, holding the soft parts retracted during resection of the bone, and the articulation is fully exposed. The insertion of these instruments and their retention in position during resection of the bone form the key to the success and safety of the operation: injury to the internal maxillary artery, which closely hugs the neck of the mandible, is thus avoided. The instruments also act as retractors, keeping the operative field open for inspection throughout the course of the work. The chisel or bur then divides the bone on the level of the tubercle, without endeavoring to remove the articular surface of the condyloid process, owing to the danger of penetrating the base of the skull. If bony ankylosis is present, ⅓ to ½ of an inch of the neck is resected, so that one can put the tip of the finger between the divided fragments across the space over the inner margin of the neck at the base of the zygoma: this manœuver must be executed carefully, and ample bone must be removed, so as to admit of the insertion of the interposing flap of fat and fascia. The periosteum should be left attached to the bone tha is removed. The deeper fragments of bone can be taken out with a small rongeur. Should one desire, as soon as the elevators have been passed behind the neck, a small and full-curved aneurysm-needle may be used to carry a silk thread around the neck: this thread acts as the carrier for the Gigli saw, and the method is rapid and effective. The difficulty of inserting the saw is slight, but the acute angulation of the instrument, which necessarily occurs, occasionally causes it to break, giving one some inconvenience in replacing it; on the whole, I do not see that it is handled as easily as the chisel. As soon as the bone is completely divided the mouth can be opened readily by the anesthetist.

The interposing fat and fascia flap is now prepared. The perpendicular incision is elongated up on the temple for a distance of, say, 1½ inches; the length must be far more than an inexperienced operator would consider necessary. Then a U-shaped flap of fat and fascia is elevated from over the temporal muscle, about ¾ of an inch wide and 1½ inches long, leaving the base attached to the upper margin of the zygoma. This flap is freed from above downward, folded downward over the zygoma, and packed into the bony gap previously described, where a portion of the neck of the bone had been removed: with a few catgut sutures it is securely tacked to the fascia and periosteum. Then the skin-wound is accurately closed with horsehair, dusted with bismuth subiodid, and sealed with collodion gauze—no other dressing need be applied. The resulting scar is almost wholly within the hair-line and is scarcely perceptible.

No special effort should be made at this time to spread the jaws, as it is important that the mandible should remain steadied on the sound side in order that the wooden block, inserted on the diseased side, may maintain the wide separation of the molar teeth until the interposing flap has healed in: this block also prevents compression and necrosis of the flap.

Summarizing the whole technic, the steps of the operation are as follows: (1) The L-shaped incision; (2) division of the ankylosis and removal of a segment of the mandibular neck; (3) raising the flap of temporal fascia and fat; (4) interposing the flap and fixing it in place; (5) closure of the wound.

As to the **results**, the operation is one of the most gratifying in the whole realm of surgery. There has been but one failure, and that I believe was due to one of three factors: (1) I did not remove the periosteum with the bone; (2) there possibly was absorption of the interposing flap with ossification of the newly formed connective tissue, as occurs in detached trochanteric fascial flaps in arthroplasties upon the knee and other joints, and (3) the parents did not carry out the instructions as to maintaining the wooden plug in position after the patient left hospital. This patient was subsequently operated upon, with a good result.

In cases of extra-articular fibrous fixation I employ the method which I believe is original with me; it consists of the utilization of mucous membrane pedicled flaps taken from the hard and soft palate as an interposing medium between the divided cicatricial connective-tissue masses for the purposes of preventing recurrence of fixation (*Jour. A. M. A.*, July 26, 1913, lxi, 245–247).

The **after-treatment** is very important. Mastication should be resumed at the end of from two to three weeks: if resumed earlier, an excess of fibrous tissue will be produced between the ends of the resected mandible. The wooden block should be placed between the molars on the affected side and kept there day and night for two weeks, to prevent possible compression-necrosis of the interposing flap. The jaw should not be spread at the time of the operation, lest the effectiveness of the interdental block in protecting the flap should be diminished.

In all my arthroplasty work there is no operation which gives the same degree of satisfaction to the patients as that for ankylosis of the temporomandibular articulation.

The history of the operation, together with an analysis of 212 cases, is given by Blair (*Surg., Gynec. & Obstet.*, October, 1914, 436–451), who concludes: "It is our belief that, except in comparatively few cases, simple stretching is neither a permanent nor an adequate method of relief for ankylosis of the jaw; but that a properly performed operation will give permanent relief with minimum discomfort and with very little risk of life and great benefit to the patient."

RETRACTION OF EYEBALL—FASCIA-FAT PLASTIC ON ORBITAL CONTENTS

Summary: Clinical history of patient; comments—disfigurement a great source of annoyance to patient; review of previous operation; scope of present operation; excellent results obtained in tissue transplantation and essentials for success; operation—fascia-fat padding of cavity in orbit; postoperative comments—allowance made for limited absorption of transplant.

CLINICAL HISTORY OF PATIENT

A FEMALE, twenty-two years of age, was readmitted to Mercy Hospital September 7, 1915. She was operated upon by Dr. Murphy on October 27, 1914. (See Vol. IV, February, 1915, 125–32, under the caption, "Old Compound Fracture of the Right Malar Bone Resulting in Loss of the External Wall of the Orbit; Outward Dislocation of the Eyeball—Unsuccessful Paraffin Injection; Successful Bone Transplantation.")

The patient now complains of a sensation in the right globe "as though it were going to burst," and of pain beneath it, which is constant and of a dull, aching character; this pain is present daily.

When the patient arises in the morning the globe feels very heavy, and the pains increase with the use of the eye. In the right eye the sight has always been poor. Occasionally headaches begin in the nape of the neck and extend to the occiput, whereupon intense pain is immediately experienced in the right eye; most of the headaches, however, are frontal in type and most marked in the right supra-orbital region, while in the infra-orbital region of the same side there is a sense of constriction.

All the pains in the globe are relieved by pressure upon the infra-orbital ridge. During the presence of intense pain in the eye the lower segment of the orbicularis palpebrarum becomes spasmodic. The right globe is lower and farther back in the orbital cavity than the left.

COMMENTS

Dr. Murphy (September 10, 1915): This patient's greatest source of annoyance now—as when she first came to us—is the thought that every one she meets regards her affected eye in a quizzical manner.

When the patient first came to us the globe was ptosed downward and outward from loss of the support of the frontal process of the malar bone, which was fractured and driven downward and inward. At operation we found it impossible to elevate the fragment and restore it to its normal position, so that we were obliged to remove a shell-like bone-transplant from the tibia, and utilize it as a substitute to fill in the defect left remaining in the outer wall of the orbit; when in place this transplant resembled somewhat a watch-crystal set in its rim—above, the rim was formed by the external angular process of the frontal bone, and below, by the malar process of the maxilla (*loc. cit.*, Fig. 25, p. 130). At present the globe is elevated to the same level as its fellow, but it is still somewhat retracted into the orbit.

Today we propose to fill in the cavity behind the transplant with a pad of fascia lata and fat, so as to advance the globe to its normal position: the amount of tissue necessary for this purpose may be gaged by putting the index-finger into the orbit between the bone-transplant and the globe, elevating the latter to its normal position. At the time of the first operation no attempt to fill in this cavity was made, since we contented ourselves merely with overcoming the ptosis and preventing the globe from falling outward. The transplant itself, which was 3/8 inch wide, is firmly united in good position.

This bone-transplant work has given perfect results. The periosteum is retained, and the fresh surfaces of the bone-graft are contacted with the freshened surfaces of the recipient bone, from which osteogenesis will proceed. The first prerequisite to success is *asepsis:* the slightest infection means that the transplant will have to come out, although this does not hold so true of bone as of soft tissue transplants. Another prerequisite is that all hemorrhage be checked before inserting the graft into its bed; and a third, that the graft be supported by external fixation apparatus.

The action of the levator palpebræ muscle has been impaired —why, we do not know, because it is somewhat remote from the field of operation. The only muscle liable to be injured in our work today is the inferior oblique, but we shall bear its position in mind and take pains not to disturb it.

OPERATION

[The adhesions around the outer margin of the orbit were completely freed, and the orbital tissues were displaced inward. At this stage some wax from the original paraffin implantation was encountered. A pad of fascia lata covered with fat was prepared and arranged in the cavity until the globe was properly bolstered up. The wound was closed without drainage.]

POSTOPERATIVE COMMENTS

Now you can see that the globe occupies a higher and more advanced position than its fellow; however, we have made allowances for a certain amount of absorption that is bound to occur, so that eventually the globe should attain its normal orientation with the walls of the orbital cavity.

Postscript.—The patient made an uneventful recovery. When she left hospital (about four weeks after operation) her globes were almost on the same level; if there was any difference in this respect, the right one was a little higher than the left.

(A collective review of the subject, "Transplantation of Tissue," by Dean Lewis, will be found in the *Lancet-Clinic*, April 1, 1916.)

TRIFACIAL NEURALGIA—AVULSION OF SENSORY ROOT OF GASSERIAN GANGLION

Summary: Clinical history of patient; comments—critique of methods of treatment of trifacial neuralgia; what the patient expects from operation; dangers of gasserectomy; operation—ligation of external carotid; avulsion of sensory root; postoperative note.

CLINICAL HISTORY OF PATIENT

A MALE, thirty years of age, linotype operator, was admitted to Mercy Hospital October 3, 1915. The family and past histories are negative.

The patient suffers from recurrent attacks of pain in the right side of his face. In 1906 he complained for the first time of spasmodic pains in the right cheek, side of nose, and upper lip: these pains lasted from several minutes to several hours and then subsided. In the last five years the attacks have become severer and have involved the mandibular division as well, but not to the same extent as the maxillary.

Five years ago osmic acid was injected into the maxillary and mandibular divisions at the foramen rotundum and foramen ovale, respectively, but without affording total relief; and five repetitions of the injection since then gave the same result. The last injection was given three weeks ago. The patient is not addicted to the use of opiates.

COMMENTS

DR. MURPHY (October 5, 1915): Of the various methods which have been advocated for the treatment of intractable trifacial neuralgia, that by peripheral resection of the trunks is practically always followed by recurrence, for the fifth cranial nerve has a greater potency of regeneration than any other nerve in the body, and it is not long before the gap in the nerve left remaining after operation is spanned by newly formed nervefibrils. Injections of alcohol or of osmic acid have for their purpose the destruction of the axons, and the prevention of their regeneration by the production of cicatricial tissue: as in all other methods, in a few cases so treated cures have been obtained, but in the large majority the pain has recurred, manifesting itself as soon as sensation returns. Extirpation of the Gasserian ganglion cures the malady permanently, but is attended with the danger of hemorrhage. In addition to removing the ganglion, the foramina have been obturated by screws (Mayo) and bone-pegs (Kanavel); and, after mere division of the trunks without gasserectomy, a mass of paraffin has been implanted between the trunks and the ganglion (Murphy)—a method which we have employed in a number of cases, and occasionally with perfect results. Avulsion of the sensory root is the safest and most promising method (Spiller-Frazier), and is the one which we shall make use of today.

When one discusses with the patient the operation of gasserectomy, the patient wants to know, first, what the immediate danger is and then what the remote danger, from injuries to the regional structures; secondly, what the chances are of obtaining relief; and finally, how great a disturbance of function is liable to follow. In addition to the immediate danger of hemorrhage referred to above, there are the dangers of paralysis and of sepsis. Profuse hemorrhage occurs when the cavernous sinus is accidentally opened. Paralysis involves the muscles of mastication of one side only, when the motor division of the mandibular trunk is destroyed; in this case, mastication is performed by the muscles of the opposite side; it also involves any of the muscles of the eyeball or all, with the exception of the external rectus, when the third or fourth cranial nerve or both are inadvertently injured. The external rectus escapes by virtue of the path taken by the sixth nerve through the cavernous sinus in close relation with the internal carotid artery. The danger of sepsis arises when the subdural space is opened up by incising the dura: this obtains both in extirpating the ganglion and in avulsing the sensory root. No great disturbance of function is liable to follow if one removes the entire ganglion.

OPERATION

[After preliminary ligation of the external carotid artery the Gasserian ganglion was exposed by means of the regular trephine and rongeur forceps, elevation of the temporal lobe, and incision of the dura. There was no bleeding from the temporal artery, and that from the veins of Santorini was somewhat less than in the average case: venous oozing was checked by soft paraffin. The sensory root was seen approaching the ganglion from behind, and was hooked up and avulsed. In addition, the mandibular trunk was divided at the foramen ovale, and a paraffin plate was spread upon the surface to check the oozing. After accounting for the Horsley sponges, the wound was closed without drainage.]

Postscript (*November 1, 1915*).—The patient made an uneventful recovery. Examination reveals entire absence of sensation of the skin and mucous membrane in the territory supplied by the trifacial nerve. Dr. Tivnen dilated the pupil and examined the eye. He found slight conjunctivitis, cyclitis, and a small corneal ulcer, for which treatment was instituted.

November 16, 1915.—The small corneal ulcer has entirely disappeared. The anesthesia of the trifacial nerve is total. As he was departing for home the patient was warned of the danger of freezing or burning his face, owing to the loss of sensation.

(For further discussion of this subject, including the history of gasserectomy, etc., consult Vol. V, February, 1916, 64–6.)

LUXATION OF CERVICAL SPINE AT ATLO-AXOID JOINT—DECOMPRESSION (TWO CASES)

Summary: Case I.—Clinical history of patient; comments—luxation of cervical spine need not cause compression of cord; operation—spinal decompression; postoperative comments—care must be taken to avoid impaling cord upon odontoid process: illustrative case of Hilton's; case of tumor of odontoid process of axis.

Case II.—Clinical history of patient; comments—skiagram shows forward luxation of atlas; operation—resection of posterior arch of atlas; postoperative comments—review of operation.

CLINICAL HISTORY OF PATIENT

A MALE, thirty-four years of age, was admitted to Mercy Hospital October 3, 1915.

On March 22, 1915, while at work, the patient was caught in an avalanche, which carried him down the side of the mountain for a distance of 450 feet: he struck a tree and was rolled over several times, but did not lose consciousness. He was picked up and carried home. He had severe pain in the back of the neck and was unable to turn his head: the left leg was bruised just below the knee. He remained in bed ten days and then was able to get up and about. His head was extended and his neck very painful and stiff. He was able to use both arms, and says that he felt all right, but that he was very weak.

On July 9, 1915, the patient was operated upon for luxation of one of the upper cervical vertebræ. He says that he was informed that the luxation was either between the first and second, or the second and third, and that the laminæ between the second, third and fourth were removed.

At present the patient cannot lift the left arm, abduct it, or rotate it; and paresthesia is present, being manifested by numbness, and hot water upon the skin giving rise to the sensation of needle-pricks. The right arm cannot be lifted or abducted. The patient cannot bring himself to a sitting posture. The paralysis has gradually increased since the operation.

COMMENTS

Dr. Murphy (October 8, 1915): Skiagram reveals anterior luxation of the atlas. This is recognized by the fact that the spine of the atlas appears in front or a little above that of the body of the axis, and the facet of the anterior arch of the atlas does not contact with the odontoid process. The posterior arch of the atlas is compressing the cord against the body and odontoid process of the axis. Because of the great spaciousness of the vertebral canal in the cervical region, extensive degrees of luxation may occur without giving rise to compression of the cord: how often the latter escapes in this manner we do not know, but this is the second example which we have encountered. Owing to the situation of the lesion above the origin of the phrenic nerve, there are no disturbances of diaphragmatic respiration. The right arm is more paralyzed than the left. At present the temperature is 96.8° F., the pulse 72, and the respirations, 20.

OPERATION

[Spinal decompression was performed by removing the laminæ of the upper cervical vertebræ. The cicatricial tissue present made this procedure very difficult. By progressing upward the arch of the atlas was to be exposed and removed. It will be noted that the respiration has been changed for the last ten minutes to an accessory-muscle respiration and that the diaphragm has ceased to act. Just why the phrenic should cease to functionate at this time is not clear. The wound was closed. He was turned on his back and artificial respiration was instituted, as only the accessory muscles acted voluntarily. He lived for four hours after the operation. He died from respiratory deficiency.

POSTOPERATIVE COMMENTS

Cases of injury or disease involving the upper cervical vertebræ must be handled very gingerly, lest instant death should arise from the head flopping forward and impaling the cord upon the odontoid process of the axis. A very graphic description of such a case is given by Hilton ("Lectures on Rest and Pain," ninth edition, 108) as follows:

"It was our opinion that her life was in imminent or perhaps instant danger; she was paralyzed, and could not swallow; her voice was excessively feeble and the pulse scarcely perceptible; she hardly breathed at all and was not quite conscious. It was evident that something must be done without delay. Believing that her symptoms resulted from the odontoid process of the second vertebra pressing upon the spinal marrow, close to the medulla oblongata, I advised that she should be made to lie down immediately. On saying to her, 'You must lie down in bed,' she replied, in the smallest possible voice, 'Then I shall certainly be killed; I can't get my breath.' Seeing there was no time for contention, I told her our opinion was that if not placed horizontally in bed she would in all probability die in a very few minutes. Being paralyzed, or nearly so, she could offer no resistance to my purpose; and I shall never forget the weight of the responsibility when I took hold of her, desired the pillows to be removed from her back, and, supporting her head and shoulders in my arms, slowly placed her upon her back, nearly flat upon the bed, with her head upon a thin pillow, some additional support to the hollow of the neck, and two sand-bags, one on each side of the head, to prevent lateral or rolling motion.

"Here was a patient in the greatest possible danger, and I do not hesitate to express the opinion that if the head had fallen forward, say half an inch, she would have died in an instant. Her sense of suffocation was soon relieved by the horizontal position, and she remained lying down during six months uninterruptedly, at the end of which time all the serious symptoms had disappeared. She was then allowed to move about the ward with caution, and a few months afterward left the hospital well, with the exception of a stiff neck, most probably depending on ankylosis or bony union between the atlas and the axis. . ."

We had a very interesting case of tumor of the odontoid process in my service some three or four years ago. The patient suddenly developed symptoms of compression of the cord, and these became worse and continued, notwithstanding our decompression from behind, until death. Autopsy showed that an osseous tumor had slowly developed and compressed the cord more and more and suddenly the compression reached the degree of paralysis, a clinical course which is not at all uncommon, even with slow-growing tumors of the cord. The suddenness of the onset of symptoms leads one frequently to interpret the case as one of hemorrhage or of metastasis of some acute lesion. The course, however, is in consonance with the sudden development of paralysis of many slow-growing neoplasms.

CASE II

CLINICAL HISTORY OF PATIENT

A MALE, eleven years of age, was brought to Mercy Hospital October 9, 1915.

On September 6, 1914, a motor, in which the patient was traveling at the rate of 35 miles an hour, suddenly skidded and turned completely around; the boy was thrown out, striking the ground on his face, his back striking against the door of the car. His face was covered with mud, and his mouth was full of mud when he was picked up: he does not know whether or not he was unconscious at this time, but does remember that he had no pain. There resulted a bruise of the left eye and swelling and bruising of the front of the neck; and his mother states that he had a red mark four inches long across his back at about the level of the shoulders, which subsequently turned black and blue. His mother also states that following the accident he was paralyzed, excepting the muscles of expression, and that he could barely whisper and had no sensation. There was involuntary passage of urine and feces. He remained in this condition for six months.

On March 1, 1915, the patient began to have tingling paresthesia on both sides of the face, which lasted one month.

About April 1st the tingling began to involve the left great toe, whence it extended up the leg; it then involved the righ leg in a similar manner, the upper extremities, and finally the whole body; this tingling became painful, so that at the end of a week the patient was very tender to touch over the entire body, with the exception of the face. This tenderness lasted three weeks.

On May 1, 1915, the mother noticed that the patient was able to move the left great toe; since then he has improved gradually.

At present the patient is able to flex the thighs upon the abdomen and the legs upon the thighs: he is also able to rotate the left arm slightly and to lift the shoulders; he cannot, however, turn the neck or the body, nor can he elevate the arms. He has partial control of defecation; and while he can tell when he wants to micturate, yet he cannot control the act. Sensation has returned to all areas with the exception of the right hand.

COMMENTS

Dr. Murphy (October 18, 1915): This patient has a visible deformity in the upper portion of his neck. Examination of the skiagram (Fig. 122) shows that the atlas is luxated forward 1/3 of an inch, so that it must be compressing the spinal cord against the odontoid process of the axis. Not only is the atlas luxated forward, but the interval between it and the axis is abnormally widened: there is no lateral deviation however. The transverse ligament of the atlas, therefore, must be ruptured.

OPERATION

[The occiput, atlas, and axis were exposed through a posterior cervical incision. The atlas was found luxated forward, compressing the beginning of the cord against the odontoid process and anterior wall of the foramen magnum. Decompression was effected by resecting three-fourths of the posterior arch of the atlas, the grooves for the vertebral arteries being carefully avoided: the dura mater was exposed, but was not opened.]

POSTOPERATIVE COMMENTS

The cord now seems perfectly free. It is quite a distance forward of the posterior arch of the foramen magnum, so that the finger can be inserted between the bone and the dura. There the vertebral artery can be seen pulsating on the side. The arch of the atlas was severely compressing the cord. Three-fourths of the arch was removed. The dura was not opened. There was no change in the respiration during the work. If you will look at the skiagram, you will see that the odontoid process seems to bear the proper relationship to the anterior wall of the foramen magnum, but the body of the atlas has gone forward, so that it presses on the anterior surface of the cord. It was feared before the operation that the foramen magnum might be moved sufficiently forward so that after the removal of the atlas the posterior wall of the foramen magnum might compress the cord. Such, however, was not the case, as the finger could be easily inserted between the posterior wall and the cord.

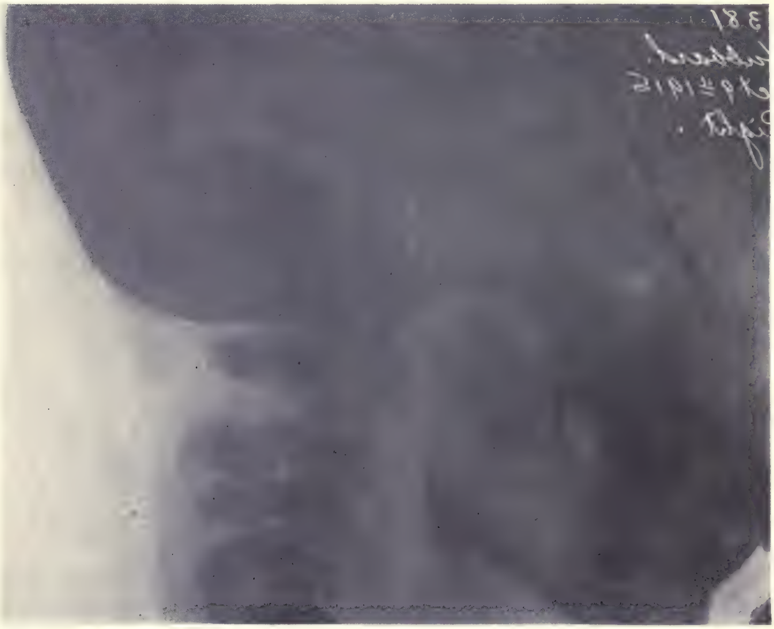

Fig. 122.—Preoperative skiagram showing luxation of atlas forward ⅓-inch. Note widening of interval between atlas and axis.

We were completely above the respiratory center in this patient, while in the case we operated two weeks ago we had to go through the cicatricial tissue over the respiratory center in order to obtain our landmarks, and in the middle of that operation the diaphragm ceased to act, meaning that the phrenics were out of commission. You know the diaphragm is the piston of respiration, which is worked by the phrenic nerves. Just as soon as they are out of commission, the patient's condition is serious. There was no change whatever in respiration in this patient today.

Postscript.—There was primary healing of the wound. The patient made an uneventful recovery. When he left hospital some weeks after the operation there was pronounced improvement in motion in the upper extremity, and his general condition was greatly improved.

At the Washington meeting of the American Surgical Association, in May, 1916, Jonas presented an interesting case of luxation of the atlas produced by manipulation. The luxation involved the occipito-atlantal articulation, the head slipping forward on the atlas. The manipulations were received at the hands of an osteopath for "generalized rheumatism," and consisted of extreme and forcible rotations of the head until the patient suddenly felt and heard a loud painful snap in the back of his neck, at the base of the skull, and his head became fixed after dropping forward, with the face partly turned toward the right side and the chin resting on the sternum. A lateral view disclosed the upper end of the cervical region projecting sharply backward on the occiput. His appearance suggested a destructive cervical spondylitis or an occipitocervical neoplasm. He spoke with difficulty, for he could separate his jaws only to a very limited extent. An osseous projection was not only palpable, but distinctly visible in the occipitocervical space. He stated that his condition had become unbearable on account of the pain in the back of the neck and occiput and his inability to separate his jaws enough to enable him to eat or speak with freedom. Anteroposterior movement was restored by resecting the arch of the atlas, together with the left superior articular surface, and the right occipito-atlantal articulation. The immediate operative effect was to permit the raising of the head so that the chin was free from the chest, enabling the patient to masticate and speak freely. There was moderate rotation. Pain and muscular rigidity disappeared. The operative recovery was normal.

TRAUMATIC RECURRENT SUBLUXATION OF FOURTH LUMBAR VERTEBRA—ALBEE BONE-GRAFT SPINAL TRANSPLANT

Summary: **Clinical history of patient; comments—retrospect of history; operation—Albee bone-graft spinal transplant; postoperative comments—importance of control of hemorrhage in bone transplant work.**

CLINICAL HISTORY OF PATIENT

A MALE, twenty-nine years of age, a machinist, was admitted to Mercy Hospital April 7, 1916. The family history is negative. The past history has no bearing upon the present condition.

Daily from October, 1911, to August, 1912, the patient rode on a truck over very rough roads. From the jolting and jarring incident thereto the lumbar region of his back before long became stiff and sore, so that at night he had to sleep with the legs drawn up and the back curved forward; toward morning, however, the soreness left, and he could then straighten himself out into a comfortable position. Whenever he stepped down hard upon either foot—especially the right foot—it jarred his back in the lumbar region and caused shooting pains across the back and down the lower extremities. He could not work in a stooping position: if he stooped over for more than a few minutes, the back began to ache and he had difficulty in straightening up, and then only very gradually. He had no chills or fever and was not totally incapacitated. The condition progressed very gradually. He became quite nervous and irritable. In August, 1912, he had to leave the employ of his company, as he could not endure riding over the rough roads on account of the extreme pain caused thereby in the back.

Up until January, 1915, the patient worked at jobs that did not necessitate riding or bending of the back. He occasionally laid off for a month, but was not totally incapacitated: he noticed that some mornings on arising his back was stiff, but there was no marked soreness, and after being up and moving around for a time, the back limbered up.

In March, 1914, while working in oil-fields, the patient's feet slipped from under him and he fell to the ground, striking on the side of the right thigh and hip: he was holding on to a pipe at the time, and pulled himself up immediately. The fall did not hurt his back any and caused no pain, and he kept on working.

In November, 1914, the patient was struck with a bar from a flywheel across the left hip and knocked along several feet, falling to the ground: this accident did not injure his back, but bruised the lower extremities.

From November, 1914, to January, 1915, the condition became so greatly aggravated that the patient had to stop work at the latter time. Thus, in November, 1914, he began to get severe shooting pains down the back of the right leg whenever he was on his feet. He also noticed that on the same side he was walking with a short step, and that on account of the severe pain he could not flex the thigh on the abdomen with the leg extended, but could do so with the leg flexed. Furthermore, the pelvis projected more to the right and tilted up.

In January, February, and March, 1915, these pains were present even while the patient was in bed or sitting up: while in bed the pain was alleviated when the patient lay upon the left side and drew up the right leg.

In April and May the pain was diminished in intensity.

In June the patient was somewhat improved by osteopathic treatments; but since then there has been no further improvement, the condition remaining about the same.

In June, 1915, and January, 1916, the patient had attacks of chills followed by fever; each attack lasted about eighteen hours, but he remained in bed about thirty-six hours. While the fever lasted the back ached as usual, but for twenty-four hours after the subsidence of the fever the back was comparatively free from pain.

The patient has never had any swelling appear in any region. Up to December, 1915, he gained in weight, but since then has lost 15 pounds. His appetite is good. He has no night-sweats.

The bowels are regular, and there are no urinary disturbances. He has never worn any mechanical support.

The luetin and Wassermann tests, made six weeks ago, were negative. Examination of the urine is negative.

Examination by Dr. Murphy (April 6, 1916).—The patient is suffering from recurring luxation of the fourth lumbar vertebra upon the fifth. He is able to reduce it himself: when reduced, he is able to flex his back (Fig. 123) and is fairly free from pain; when it is not reduced, one of the lumbar nerves is impinged upon, giving him great pain, and he cannot bend his lumbar spine at all (Fig. 124). Flexion to either side is painful. There is flattening of the body of the fourth lumbar vertebra on the left and wearing off of the edge, showing where it overrides. There is a deviation in the direction of the spinous processes. When the patient is told to twist to the right and unlock the subluxation, he bends clear to the floor.

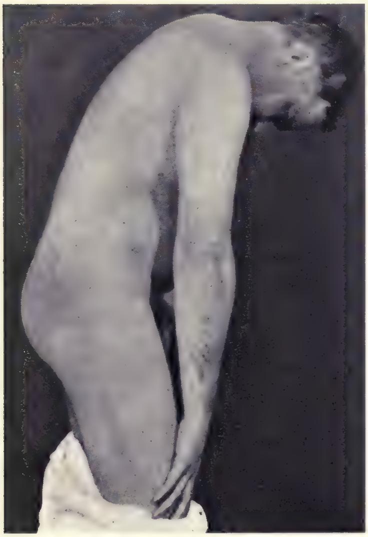

Fig. 123.—When luxated fourth lumbar vertebra is reduced, patient can bend back as far as picture shows, and is fairly free from pain.

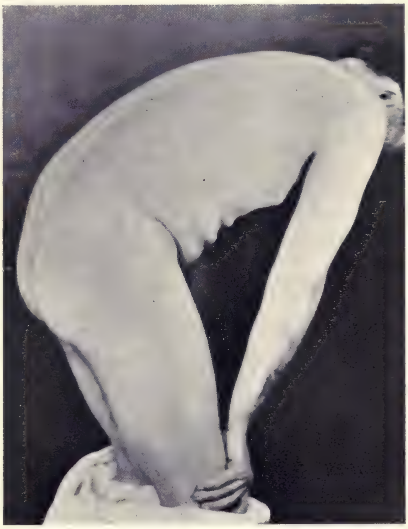

Fig. 124.—When luxated fourth lumbar vertebra is out, patient cannot bend his lumbar spine at all, and great pain is produced by impingement upon one of the lumbar nerves.

COMMENTS

Dr. Murphy (April 28, 1916): This is an extraordinary and exceptional case: it is not tuberculous in origin, but traumatic.

I wish to emphasize a point which was brought out in the history, namely, the fact that the patient cannot flex his leg on the thigh with the knee extended, which is one of the common signs for a neuritis of the sciatic nerve. However, he has no such lesion. In conjunction with the subluxation, one of the roots of the sacral plexus is involved, giving rise to "sciatica" from traumatic irritation, and preventing the patient from flexing the thigh on the abdomen with the leg extended—the classic test for neuritis of the sciatic nerve.

The sole method of treatment which can benefit the patient is that of absolute fixation of the spine by the Albee bone-graft-splint method. I have figured out that this can be best accomplished by the Albee bone-graft method and I am attempting it for the first time in the history of its use in a lesion of this type.

OPERATION

[By the technic described below on p. 611, a bone-graft-splint of suitable size and shape was removed from the tibia and inserted into a gutter prepared by splitting the spinous processes of the third, fourth, and fifth lumbar and the first sacral vertebræ. A plaster jacket was applied. The work was performed without hand-contacting.]

POSTOPERATIVE COMMENTS

The bone-graft-splint fitted into its bed very snugly. In this work it is essential that all bleeding be stopped before inserting the bone-graft: this may very readily be accomplished by temporarily packing the bed with gauze; a ligature is seldom required.

The patient will rest upon his abdomen for the remainder of the day.

Postscript.—There was primary union. The patient was kept on his abdomen for two weeks and in the recumbent position for twelve weeks. Then a leather jacket was applied, including the trochanter and extending up to the scapula. The *x*-ray shows the development of a large amount of osseous tissue around the graft.

TUBERCULOSIS OF SPINE (THREE CASES)—CASES I AND II: ALBEE BONE-GRAFT SPINAL TRANSPLANT; CASE III: DECOMPRESSION

Summary: Case I.—Clinical history of patient; comments—site of lodgment of tuberculosis in spine; differential diagnosis; importance of distinguishing cause of backache; cases of non-tuberculous spondylitis; sciatic pain in spondylitis; operation—Albee's bone-graft spinal transplant; postoperative comments—*modus operandi* of bone-graft-splint for Pott's disease; unjustified criticism of Albee operation.

Case II.—Clinical history of patient; comments—retrospect of history; prevention of deformity by operation; laws of bone-grafting; operation—Albee's bone-graft spinal transplant.

Case III.—Clinical history of patient; discussion by Dr. Mix. Comments by Dr. Murphy—the pathologic probabilities; natural history of tuberculosis of spine; operative difficulties presented by this case; operation—spinal decompression.

CLINICAL HISTORY OF PATIENT

A MALE, twenty-four years of age, a cleaner and dyer by trade, who was residing with his parents, was admitted to Mercy Hospital June 29, 1915. The family history reveals that the patient's father died two years previously of pulmonary and osseous tuberculosis, at the age of forty-five years. The past history reveals the usual diseases of childhood and a gunshot wound of the left thigh during the same period: this wound suppurated, but healed within six weeks. The personal history reveals an attack of gonorrhea eight years ago.

In September, 1914, the patient noticed for the first time that any jolt—such as from stubbing the toes—gave rise to pain in the right lumbar region, and at times felt the same pain on turning about quickly. The pain was of the aching type.

This pain is the patient's sole subjective complaint: it always involves the right lumbar region. So far as he knows fever and chills have been absent. He has continued working at his trade; the only inconvenience is that when bending forward his back is not so supple as formerly. He has not lost in weight. The temperature on admission is normal.

Examination on June 28, 1915, revealed definite kyphosis and fixation of the spine from the ninth thoracic vertebra to the second lumbar: so marked is this fixation that lateral bending is impossible. There is extreme sensitiveness to fist-percussion over the right kidney, but this is due to spinal disease, rather than renal.

COMMENTS

Dr. Murphy (June 30, 1915): This patient is suffering from tuberculosis of the spine in the thoracicolumbar region.

When tuberculosis involves the spine, it lodges primarily in the cancellous tissue of the centrum, and always in that part of the centrum which bears the brunt of the vulnerating force of the trauma which usually precedes the development of the infection: thus one is often able to locate the site of the lesion in the centrum from the patient's history of the accident (*vide* Vol. V, February, 1916, 79). Of aid in the differential diagnosis is the statement of the time of onset of the pain in relation to the time of the accident, while a positive tuberculin reaction determines the type of infection.

To slur over a patient complaining of backache may be fraught with great danger! Not that it is my intention to enumerate the various causes of pain in the back: they are legion; but for some reason, because the pain is in the *back*, it is not scrutinized so carefully as pain in the *abdomen*. Every backache has a definite cause, which may be toxic, static, or reflex, and every backache, which is too frequently dismissed as "lumbago,"—which means nothing at all,—should be investigated by history and by physical examination with as much care as an obscure affection in the upper abdominal zone. A case which was almost dismissed in this trivial manner proved to be a perinephric abscess. An excellent analysis of the subject was made by Morley (*The Practitioner*, 1914, xcii, 193), showing the possibilities of injuries of the back, calling a spade a spade, instead of generalizing under the term "sprain." The structures which may be involved are the bone, the muscles, the fasciæ, the various ligaments, the joints between the articular processes, the vertebræ themselves, the intervertebral discs, the spinal cord, and the nerves.

Illustrative of involvement of the joints between the articular processes and of the periosteal and perichondrial sheaths is the crop of spondylitides, as I call them, which comes to us annually in the fall or early winter from neighboring rural districts. These patients complain of intense backache. Such a patient says, for example, "While out husking corn one day I noticed that I had taken cold, because my nose was running. I continued to work, however, until one night I was suddenly attacked by pain in my back." While afflicted with the acute infection of the cold the patient suffered an occupation-trauma, and metastatic spondylitis—non-tuberculous in type—manifested itself about two weeks after he had caught cold. The treatment of such a case is to immobilize the vertebræ by applying a plaster jacket.

Sciatica is but a sign of disease elsewhere, for true neuritis of the sciatic nerve is extremely rare. The common etiologic factor of the sciatic pain is spondylitis involving the lower members of the lumbar vertebræ, or the sacrolumbar articulation. When a patient with this malady bends forward it is found that the lower part of the spine is fixed. In other cases fixation in this region results from pressure-neuritis due to infection of the periosteum lining the intervertebral foramina, with concomitant edema which presses upon the spinal nerves as they pass through those foramina.

OPERATION

[A bone-graft was removed from the antero-internal surface of the tibia and inserted into the split spinous processes of the involved and adjacent healthy vertebræ, according to the Albee technic (Fig. 125).]

POSTOPERATIVE COMMENTS

What is the *modus operandi* of the spinal bone-graft for Pott's disease? By its splint action it supports the crumping spine, thereby relieving the pressure upon the softening centra. Hibb's method, whereby the spinous processes are freed by snipping their bases and turning them downward until they overlap, is a very good one. Albee's method of inserting the bone-graft into the split spinous processes is a very excellent one, preventing motion by virtue of the firm mechanical support which it affords: both lateral and anteroposterior deviations are opposed, the lateral processes serving as fulcra, the spinous processes being the short arms of the levers, and the centra, the long arms.

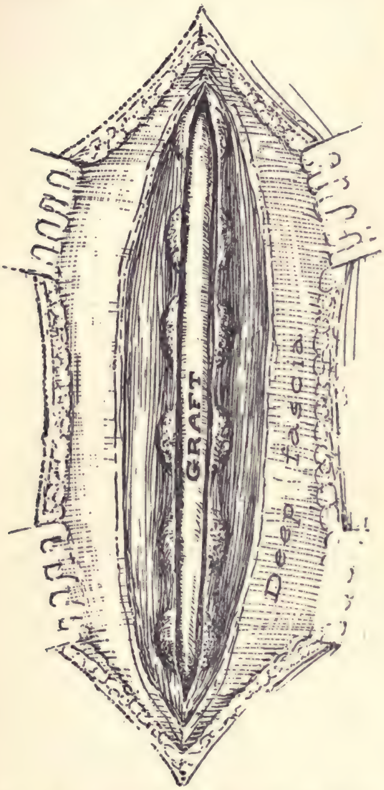

Fig. 125.—Bone-graft splinting of spinal column (Albee's method).

The question of what effect the bone-graft-splint will have upon the growing vertebral column of the child has not yet been settled, for while each vertebra continues to expand in all its parts, yet the bone-graft-splint does not keep pace by growing in length.

In the adult an entirely different proposition obtains: here the aim is to secure rapid immobilization of the vertebral column and relieve the anterior portion of the affected centrum or centra from the weight and motion of the superincumbent spine, thrusting this weight upon the usually less involved posterior portion of the centrum or centra.

There is no doubt that the Albee operation has received much unjustified severe criticism, when the fault lies with the criticising operator himself, for not having followed Albee's directions to the letter. Notwithstanding the enormous amount of bone-work we do we had in the past refrained from employing this operation until Albee had had time to establish it upon a firm basis by the accumulation of convincing data, and this he has already done.* We think that, by having one man work out a given surgical problem and come to some decided conclusions as to whether or not it should be accepted, and if supported by overwhelming numerical evidence, much criticism and dissatisfaction on the part of the patient could be avoided.

Postscript (*November 16, 1915*).—There was primary union, and examination today reveals that the spine is rigidly immobilized.

CASE II

CLINICAL HISTORY OF PATIENT

A MALE, forty-six years of age, was admitted to Mercy Hospital November 11, 1915. The family history is negative. The past history reveals that the patient was operated upon for appendicitis fourteen years ago.

On January 1, 1915, the patient fell off a horse, landing on his shoulders and neck. He was able to get up without assistance and suffered from no marked pain, but the neck was stiff and he had difficulty in moving it.

Since the accident the pain and the stiffness have been increasing in severity.

On June 1, 1915, the patient began to have attacks of vertigo.

The patient is unaware of having had fever. There are no motor disturbances in arms or legs.

The patient was first seen by Dr. Murphy on November 3, 1915. He was given a tuberculin test, 5 minims of dilution No. 2. He returned to the office on November 5, 1915. There was pronounced reaction to the tuberculin, the temperature having reached 102° F. at 3 P. M. on the afternoon following the injection. The pain in his neck was better after administration of the tuberculin. He was ordered to continue taking his temperature and to return on the ninth. From the fifth to the ninth the highest temperature reached was 99° F. at 4 P. M. He was given another tuberculin test, and the result was again positive, the temperature reaching 101.5° F. at 3 P. M. the following afternoon.

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* "A Statistical Study of 539 Cases of Pott's Disease Treated by the Bone Graft," by Fred H. Albee, M.D., New York (*American Journal of Orthopedic Surgery*, March, 1916, 134–142). "Of the author's [Albee's] personal cases, only those that have been operated upon one year or longer are included in this report. There are 198 of these: in 184 the disease was arrested; in 2 there was improvement. To date, 12 have died. Six of these 12 were entirely relieved of their Pott's disease symptoms and died of some intercurrent disease."

COMMENTS

DR. MURPHY (November 13, 1915): To begin with, the patient suffered concussion of the brain; and after this was recovered from, pain appeared in his neck in the region of the seventh cervical and first thoracic vertebræ. After the immediate soreness had subsided, permanent soreness began, and, at present, when the patient bends his neck in certain positions, he always gets a pain, and the motion is becoming more and more limited. Skiagram reveals an incipient tuberculous focus in the centrum of the seventh cervical vertebra.

By way of treatment our efforts are directed to preventing the posterior deformity which occurs when tuberculosis involves the cervicothoracic region—the angulation of the neck which keeps the patient looking at the ground for the remainder of his life.

The Albee bone-graft-splint operation is the procedure *par excellence* for fixation of the spine and consequent rapid repair of the tuberculous focus, and is desirable because it does the work quickly and effectively. In working out this scheme Albee followed exactly the laws we laid down for bone-transplanting: when violated, these laws do not result in bony union. First, the transplant is to be obtained from the same individual; secondly, it is to contact with freshened bony tissue where it is transplanted; thirdly, the periosteum is transplanted together with the bone-graft when desired: we do not believe that this step is essential, but nevertheless we are carrying the periosteum with the bone-graft and have been since the beginning of our work; fourthly, it is necessary that the patient be kept quiet during the process of bony union. This is a very essential factor.

We believe that the bone-graft has a decidedly stimulating effect upon osteogenesis. The fact that the auto-transplant alone should be used is fairly well established in bone-grafting work, for it yields the largest percentage of cases of permanent union. This is in consonance with the results of ovarian transplants and particularly with the more recent cancer transplant work.

OPERATION

[The typical Albee operation was performed. A gutter was prepared for the reception of the bone-graft by splitting the spinous processes of the three lower cervical vertebræ and the four upper thoracic. The wound was packed with a gauze tampon to effect hemostasis while the bone-graft was being removed from the tibia. The bone-graft was removed in the usual manner, inserted into the spinal gutter, and retained *in situ* by a double row of catgut sutures passed through the vertebral aponeurosis and the supraspinous ligaments. The wound was closed with horsehair sutures and without drainage.]

POSTOPERATIVE COMMENTS

The patient will be placed upon his back and kept in that position during the process of repair. [A plaster case involving his head, neck, and shoulders was put on completely to immobilize the body during the process of bony union. This case was kept on for ten weeks.]

Postscript.—Complete primary union took place. The patient made an uneventful recovery. The latest reports stated that he was in splendid condition.

CASE III

CLINICAL HISTORY OF PATIENT

A MALE, forty years of age, grain dealer, was admitted to Mercy Hospital February 8, 1916. The family and the past history are negative.

Within the past three years the patient has suffered injury to his head and neck each year. The first injury was received in June, 1913: while motoring at high speed he was bounced off the seat, striking his head against the bow on the top of the machine. This blow did not lacerate the scalp, nor render the patient unconscious, but it was followed by stiffness which lasted two or three days and then disappeared.

The second accident occurred in November, 1914: while loading grain on a car the door of the latter fell off, striking the patient upon the right side of the face and neck, shoving his head far to the left and bearing him to the ground. This injury neither produced lacerations nor rendered the patient unconscious, and he continued his work that day. The accident was followed by stiffness, which was present every morning for about ten days, lasting a few hours and then disappearing.

The third accident happened on June 2, 1915: while planting corn the patient slipped and fell backward from the corn-planter, landing on the back of his head and neck. This injury neither produced lacerations nor rendered the patient unconscious, and he continued his work immediately. The next morning, however, his back was very sore and stiff—especially on the right side—but he went to work that day and the following day as well. On June 5th—three days after the accident—he stayed in bed on account of severe pain in the right side of the neck and in the back of the head.

Toward the latter part of February, 1915, the patient noticed that his left arm was weak: it gradually became weaker, and in July, 1915, he noticed that his left leg was not so strong as the right; there was, however, no pain in arm or leg. After the fifth of June he remained in bed every morning until noon, when the pain in the head and neck subsided to a sufficient degree for him to go out to work.

On June 15, 1915, the patient's malady was diagnosed as "muscular rheumatism," and he was treated with liquid medicine.

In July, while being rubbed down after a bath, the patient was informed that there was an enlargement in the region of the third cervical vertebra.

On August 1st the right arm became weak, but the right leg was as strong as ever.

On August 17th a skiagram revealed tuberculosis of the upper cervical vertebræ.

On September 10th a brace was applied to the patient's neck, but caused so much pain that it was removed five days later.

On September 15th the temperature, taken for the first time, gave an afternoon reading of 99° F.; and from now on the patient remained in bed eleven weeks. As the result of this prolonged rest he felt greatly improved and gained seven pounds.

During the past four weeks the patient has worn a jury-mast with a ten-pound traction-weight applied: this mode of extension, however, has afforded him no relief.

At present there is very little motion in any of the limbs, but a tolerable degree of pain is present. The patient is again losing in weight. For the past three months he has had increasing difficulty in expelling urine and feces.

Examination by Dr. Murphy (February 8, 1916).—There is no alteration in the conformation of the cervical vertebræ in front, such as one would expect were tuberculosis present in that zone. Inspection of the posterior wall of the pharynx reveals neither protrusion nor deviation. The patient's breathing is labored: it is wholly diaphragmatic, for all the accessory muscles of respiration are out of commission.

COMMENTS

Dr. Murphy (February 12, 1916): Dr. Mix has studied this case from the neurologic standpoint. In discussing it with you he will show you how he made his estimates of the location of the lesion.

Dr. Mix: Taking up the reflexes first, we find that the Achilles, patellar, triceps, biceps, and deltoid are all very much increased. The abdominal, epigastric, and cremasteric reflexes are absent on both sides. As to the pathologic reflexes, there was a Babinski toe-phenomenon found on the left side alone. The patient had a double ankle-clonus and a double patellar clonus. These findings indicate an involvement of both pyramidal tracts.

Secondly, the sensory losses: On examining the patient carefully as to sensation, there was found to be a loss of the epicritic as high as the territory of supply of the superficial cervical nerve. Though the epicritic sense was lost, the protopathic was maintained. Everywhere on the surface of the body he was able to feel, but at no place was he able to feel things normally, except upon his face.

Thirdly, the motor losses: There was spastic paresis of both legs, notwithstanding the statement that the patient had had no weakness in the right leg, and also spastic paresis of both arms as high as the innervation from the fifth cervical segment of the cord. In other words, all the brachial plexus territory shows spastic paresis of both the right and left arms. Moreover, there was spastic paresis of all the muscles of respiration except the diaphragm. In the erector spinæ group there was some spasticity of the muscles of the neck. It is difficult to make out paresis of individual muscles supplied by the cervical plexus, but as nearly as could be made out, it seems as though the muscles of the back of the neck were spastic and paretic.

The diaphragm is somewhat active, but apparently not perfectly so. On inquiry as to his breathing, the patient said that sometimes his muscles were "set pretty firm," and that he could not move his abdomen as well as he might. On the day that I examined him, it was not possible for him to move his diaphragm as actively as he might have been able to move it. He could raise his first rib, and it seemed to me that the scaleni muscles were properly innervated. He told me that swallowing is at times difficult, indicating that possibly he has had trouble almost as high as the territory of supply of the hypoglossal nerve. On the day I examined him the vesical sphincter was fairly well controlled.

Fourthly, the trophic losses: Trophic disturbances are absent in his case. He has never had any bed-sores nor trophic losses of any sort.

When we had assembled the facts in the history, together with the physical examination, we were unable to arrive at a diagnosis. Evidently, it was the second accident occurring in November, 1914, which caused the weakness of the left arm in

February, 1915, a period of three months. Such a period of time is of about the right length for the development of either sarcoma or tuberculoma after an accident. A sarcoma following an accident sometimes develops fairly rapidly: occasionally within a few weeks' time it may be discovered, but as a rule it is very much later in manifesting its presence. Tuberculomata are liable to develop after a period of intermission of from six to ten weeks. In the present case, therefore, it is fair to infer that a traumatic sarcoma or a tuberculoma may have followed the accident of November, 1914. The spastic paresis of the left arm indicates rather an involvement of the left pyramidal tract of the spinal cord. We should not expect to find spastic paresis in injuries of the brachial plexus. If the brachial plexus were injured alone, we would expect to find flaccid paralysis,—a paralysis of the peripheral nerve type,—such a paralysis as occurs, for example, in peripheral multiple neuritis.

Of great importance in his case is *the absence of pain.* This is very peculiar, because in most of our cases where there was a lesion of the spinal cord from trauma, pain is liable to occur from the fact that most of the injuries result in a certain amount of irritation of certain posterior nerve roots. Nevertheless, there are innumerable cases of the absence of pain in fracture-luxations of the vertebræ. In a case of tuberculoma or sarcoma, however, with pressure myelitis, we should expect to find pain. The absence of pain in this patient's case raises the presumption of fracture-luxation, rather than tumor compressing the cord as a result of the trauma.

A very important diagnostic feature in this patient's case is the extent of the sensory losses. You will remember that I said that he had a loss of his epicritic sense as high as the innervation of the superficial cervical nerve. This places the lesion somewhere in the vicinity of the third cervical vertebra, at least. From the muscular involvement which, at times, is affecting the diaphragm (the innervation of which muscle is the phrenic nerve issuing from the third, fourth, and fifth cervical segments of the cord) we suspect that the lesion is situated as high as the third cervical vertebra. We are led to this conclusion from the evidence as to the motor loss and the sensory loss, which both point to the same level, namely, the third cervical segment. We, therefore, are of the opinion that there is pressure on the spinal cord in the region of the third cervical segment.

We have finally to look at the skiagram, which is shown in the shadow-box. You will note that there is a narrowing of the spinal canal in the cervical region. The narrowing begins at the level of the seventh cervical vertebra. As you pass up, you will note that the narrowing becomes greater and greater, reaching its maximum at about the third cervical vertebra; from this point on the spinal canal widens out again. This narrowing confirms our opinion that fracture-luxation is present. It is the fracture-luxation which caused this narrowing of the spinal canal, and it is also compressing the cord.

On the basis of these findings we believe that the accident in November, 1914,—which was the severest of the three and the one in which the patient was knocked down by the door of the grain-car,—was the one in which his third cervical vertebra was slightly luxated. We believe that the onset of his weakness in the left arm in February, 1915, was a direct sequence of this accident. We believe that the accident in June aggravated the results of the accident of November, 1914: that this latest accident led to the rapid involvement of the other arm and leg and of the bladder disturbance. We believe further that the only measure which can benefit this patient is to release the pressure over the third cervical segment by a decompressing laminectomy. We do not look for a tumor, because of the absence of pain; rather, we look for a fracture-luxation with compression. It is a very dangerous region to operate upon, because it encroaches on the phrenic nerve supply, and an injury to the phrenic nerve might lead to a complete paralysis of one or both halves of the diaphragm with possibly fatal exitus.

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Dr. Murphy: That is a good description of the neurologic findings. What concerns us as surgeons is the pathology. If we are unable to remove the disease, what would the result of decompression be? Dr. Mix has called attention to the fact that the pressure seems to be from the side—that it involves the pyramidal tract. This is in keeping with the *x*-ray findings, which show that there is not as much change in the conformation of the vertebræ as in the width of the space. Skiagrams do not always differentiate sarcomata or tuberculomata.

If you would charge the present malady to any one of the three injuries, if it is tuberculous in nature you must charge it to the second injury; but if sarcomatous, you may charge it to any one, for sarcoma of bone exhibits such great variations in speed of destruction—so rapidly, indeed, may it destroy, that complete destruction is at times attained in three days.

In tuberculosis of the spine there is a fairly definite history: First, the trauma; then three to six weeks' intermission with no symptoms; then manifestations of "growing pains" when in children, or lumbago in adults. Next, these symptoms slowly increase until at last the patient comes to you with the spine rigid, and manifestations of root-pressure (radicular pains) often precede the development of rigidity of the spine. Last fall we had a case of compression of the spinal cord from a tuberculous sequestrum. (See Vol. V, February, 1916, 67–77.)

With paralysis of the type which Dr. Mix described so accurately there is suspension of transmission and not degeneration of axons; but should this state be allowed to continue, degeneration will eventually supervene and render operation hopeless.

From the operative standpoint this case presents many difficulties: part of the diaphragm and the accessory muscles of respiration are out of commission, so that but feeble respiratory power remains to carry the patient through the operation of laminectomy, which, by its very nature, is a slow procedure, and under these circumstances one is made to feel that death on the operating table is by no means a remote probability. In order to lessen the degree of tension upon the diaphragm this patient's abdominal muscles must remain free from pressure: I should like to put him upon his abdomen while operating, but in that position the diaphragm might become fatigued. The lower portion of his body must be more than bent over, and his neck flexed forward. If this compression of the cord should continue, the patient's diaphragm will shortly be totally out of commission, and he will then be liable to contract hypostatic pneumonia. If one expects good operative results in cases of tuberculous granuloma of the spinal column, decompression, just as in the case of the brain, should be performed early, and this is the factor that prompts me to operate upon this patient.

The patient's temperature at 6 A. M. today was 98.8° F.; pulse, 108; respiration, 20.

OPERATION

[Upon resecting the spinous processes and laminæ of the third and fourth cervical vertebræ a tumor corresponding to their extent was found, but the dura was not opened. The wound was closed without inserting drainage.]

POSTOPERATIVE COMMENTS

By performing decompression we have freed the cord from pressure from in front as well as laterally: if this pressure was due to sarcoma, the latter is doubtless well encapsulated; while if it was due to a tuberculous granuloma, such a lesion, when freed from pressure, tends to undergo spontaneous healing.

We have been very much interested in this class of cases, and I regret to state that they are only too numerous. In a very interesting case, when the question of diagnosis came up, a circular letter was sent out to the specialists who perform this type of work. In this letter it was stated, among other things, that the patient "had complete paralysis from the fifth cervical segment downward, and filaments from the fourth and third segments were also caught. The diaphragm is still in action."

When the spinal cord is severely injured or sectioned at the level of the fifth cervical segment, the temperature rises to from 106° to 111° F., and the patient dies within four or five days: when, on the other hand, the cord is severely compressed, to the high temperature there are added trophic changes. In the case I cite, since trophic changes and priapism were absent and the highest temperature was 103° F., we insisted that the cord was not cut, and that the patient should be submitted to decompression. Whether or not that pressure had existed long enough to produce axonal degeneration time alone can tell, but I judge not, for the patient had no bed-sores before the operation, nor afterward, showing that the cord was not further traumatized during the operative procedure.

These factors are important in helping one decide what to do for the patient. If the cord is compressed, it should be decompressed just as soon as the patient is out of the primary shock of the accident; if, on the other hand, the true cord is divided, operation should never be performed, for regeneration can never take place, owing to the absence of neurilemma-sheaths; while if the cauda has been divided, operation should always be performed, for, owing to the presence of neurilemma-sheaths in the cauda, when the filaments are accurately contacted by suture, regeneration takes place. (See Vol. IV, August, 1915, 737–739.)

Postscript.—The patient progressed fairly well after operation until February 17th,—the fifth day,—when he suddenly expired at 9.45 P. M. At 1 P. M. on the day of operation—one-half hour after operation—the temperature was 99.8° F.; pulse, 120; respirations, 18.

(For bibliography of injuries and diseases of the spinal canal and cord consult Vol. V, February, 1916, 57.)

FRACTURE OF HUMERUS (ANATOMIC NECK) WITH LOSS OF HEAD—RESECTION AND ARTHROPLASTY. TALK ON TECHNIC OF ARTHROPLASTY OF SHOULDER-JOINT

Summary: Clinical history of patient; comments—operative prospect of case; hazard of operating immediately after occurrence of a fracture; management of case of detached head of humerus; indication for arthroplasty; operation—resection of viciously united tuberosity and of upper end of humerus, reshaping a new head: interposition of flap of capsule and deltoid muscle; talk on technic of arthroplasty of shoulder-joint.

CLINICAL HISTORY OF PATIENT

A MALE, forty-seven years of age, a physician, was admitted to Mercy Hospital October 8, 1915.

The patient complains of a lesion of the right shoulder-joint. Over six months ago—on March 25, 1915—the motor in which he was riding turned turtle, throwing him out in such a manner that he struck the ground upon his extended right hand: the anatomic neck of the humerus was fractured, and contusions of the head and face were received. During the two hours following the accident he lost consciousness and regained it several times: he states that for three weeks after the accident he fell asleep at times and was awakened only with difficulty.

The day after the accident the patient was operated upon: the head of the humerus was removed.

Two weeks after the operation and again four weeks afterward, passive motion was instituted under an anesthetic: skiagram showed that the passive motion had produced fragmentation of the upper end of the humerus. Seven weeks after the operation daily massage and very gentle passive motion were instituted.

The patient left hospital on July 3, 1915: since that time he has had no treatment with the exception of gymnastics, which he carried out himself. He can abduct the arm within an arc of 20 degrees, but cannot rotate it. He is able to bathe, shave, and dress himself, and to put the right hand upon the left shoulder.

COMMENTS

Dr. Murphy (October 9, 1915): As the result of the forced manipulation two weeks after operation, the tuberosities have been avulsed. It looks as though permanent motion could be restored by operative mobilization of the joint, but with simultaneous resection of the projecting knob of bone at the upper end of the humerus, the latter will strike against the outer margin of the glenoid cavity. After removing the knob of bone I think that it will be advisable to interpose a flap in the joint-cavity to prevent the reformation of adhesions and ankylosis. The deltoid muscle is recovering its tone in a very satisfactory manner.

The history should state that there was no infection of the shoulder-joint following operation: this shows that the surgeon who operated upon the patient did good work, because the day after the accident—when tissue-resistance was at its very lowest ebb—he succeeded in removing the head of the humerus and succeeded without infection. We do not think that we would care to take such a chance, but prefer to let ten or twelve days go by, so that the traumatized tissues may have an opportunity of coffer-damming themselves against infective bacteria which might gain entrance to the joint through the operative wound. After exposing the joint we would have removed the head, freshened it, put it back into the glenoid cavity, and nailed it to the upper end of the humerus: it would have healed in just like a bone-graft, for in every case in which we performed the operation the head healed in place very promptly.

From the forced manipulations under an anesthetic the greater tuberosity was avulsed through the medium of the supraspinatus tendon and united to the upper end of the humerus in a vicious position, striking against the glenoid margin when the arm reaches 20 degrees of abduction from the vertical position: it is this deformity that we must overcome. If, during the course of the operation, the humerus is subjected to much freshening, it will be imperative to interpose a flap in the joint to prevent ankylosis from union of the freshened surfaces; otherwise we shall merely close up the operative wound as after an ordinary resection.

OPERATION

[An anterior incision was made parallel with and through the anterior fibers of the deltoid muscle close to the deltopectoral sulcus, after the method of Ollier. On displacing the deltoid outward the viciously-united greater tuberosity was exposed, still covered by the capsule of the joint. The capsule was divided over this projection, and the latter was resected, together with the periosteum which covered it, lest new bone should be produced by detaching the periosteum and leaving it behind. There was much cicatricial tissue in the capsule, which was resected. It was found necessary to remove a little more bone from the upper outer angle of the end of the humerus, so that the patient would be enabled to raise his arm to the vertical. After being trimmed and reshaped, the end of the humerus very closely resembled the head of a normal humerus. Owing to the large area of freshened bone left remaining it was decided to perform arthroplasty. To this end an interposing flap was prepared from a convenient portion of capsule and deltoid muscle and arranged around the reshaped extremity of the humerus. The lower portion of the capsule was not disturbed, and its preservation was what necessitated the removal of bone from the upper outer angle, in order to accomplish the purpose referred to above. The operative wound was closed without drainage.]

Postscript.—The stitches were removed on October 19th: there was healing *per primam*.

TALK ON TECHNIC OF ARTHROPLASTY OF SHOULDER-JOINT

In the operation as worked out on the cadaver, the skin and deltoid are split, the deep fascia being separated along the anterior margin of the latter muscle for a distance of 4 inches and elevated so as to expose the coracoid process, which, together with the attached heads of the biceps (short head) and coracobrachialis muscles, is divided about ¾ inch from the tip and displaced outward. A curved chisel is then used to separate the bony union between the glenoid and the head of the humerus, and an additional excavation on the surface of the glenoid is made. An incision is then made at right angles to the original incision across the chest, over the middle of the pectoralis major muscle; a flap of fat, aponeurosis, and pectoralis major muscle is then elevated, 4½ inches long and 3½ inches wide, with its pedicle left attached to the humerus. It is swung upward and interposed between the head of the humerus and glenoid, completely covering the bony surfaces. In lieu of this simple procedure the following may be adopted, as in this case.

Coville made a 4-inch incision, beginning below the clavicle and passing external to the coracoid process, down along the arm, following the fibers of the deltoid muscle. This muscle is incised just outside of the deltopectoral groove, when the shoulder-joint will be found to be exposed freely. Coville then extracted the head of the humerus and divided it from the remainder of the bone, at the level of the anatomic neck. The long strip of deltoid muscle was cut transversely, the superior portion being left adherent. A piece 4 inches wide was taken from the transverse section and interposed between the head of the bone and the glenoid cavity.

Coville perforated the capsule with a probe so as to prevent wounding the musculospiral nerve, and made a counter-incision at the same level, passing a thread through the opening. This thread surrounded the extremity of the muscular strip in the form of a loop, and by tightening this loop the strip of muscle is applied to the articular cavity.

Besides using a muscle-flap in the manner described above, one may substitute and use as an interposing flap the anterior portion of the deltoid, inserting it anterior to the coracobrachialis and short head of biceps. The result in Coville's case was excellent: three days after the operation passive motion was instituted and eventually the patient—a female—was able to sew, although abduction was limited.

The muscle does not make as good an interposing material as fascia. It is difficult, however, in this region to get a good thick fascia. As that cannot be accomplished and it is not a weight-bearing joint, the fascia lata and fat may be used as a cap to cover the head of the humerus. In a weight-bearing joint it would not be sufficient. In this type of joint, when the work is aseptically carried out, it is efficacious.

FRACTURE OF HUMERUS (CONDYLES) AND RADIUS (HEAD)—RESECTION—ARTHROPLASTY

Summary: Clinical history of patient; comments—nature of lesion; correct diagnosis essential for effective treatment of elbow-injuries; advantages of the Jones position; extra-articular nailing; plan of operation; operation—neuroma of ulnar nerve; fracture of both condyles and of head of radius; ulnar nerve released and shifted anteriorly; resection of condyles and head of radius; arthroplasty; postoperative comments—after-treatment; remarks on the operation of arthroplasty.

CLINICAL HISTORY OF PATIENT

A FEMALE, thirty-one years of age, was admitted to Mercy Hospital October 4, 1915.

The patient complains of inability to flex the left forearm. On July 5, 1915, she was hurled out of a motor, receiving an injury to the left elbow, but with no laceration of the skin. After "reduction" the forearm was dressed in the extended position. At the end of one week the patient began to flex the elbow; at the end of three weeks the splint was removed; at present the elbow is fixed in the position of extension.

COMMENTS

DR. MURPHY (October 6, 1915): There is no voluntary motion in the elbow-joint, but rotation of the radius at the superior radio-ulnar joint is unimpaired. The skiagram (Fig. 126) reveals fracture of both condyles with displacement—the internal condyle ascending and the external descending, so that there is loss of the carrying angle.

In the management of fractures and luxations of the elbow the first and most important step is to make a correct differential diagnosis as to what has happened: Is it a luxation backward of one or both bones? Is it a fracture of one condyle? Is it a fracture of both condyles? Is it a fracture of the olecranon process? Is it a fracture of the head or neck of the radius?

Fracture of both condyles with posterior displacement of the lower fragment constitutes one of the most dangerous types that come to us, as well as one of the most frequent. My colleague, the late Dr. Lee, always dressed such a fracture by bringing the forearm up against the arm: that was over a third of a century ago, but it is still the best non-operative method. This "natural splint" position, which now bears the name of Robert Jones, of Liverpool, automatically reduces the fracture, maintains it in excellent position, and leaves the hand in the most

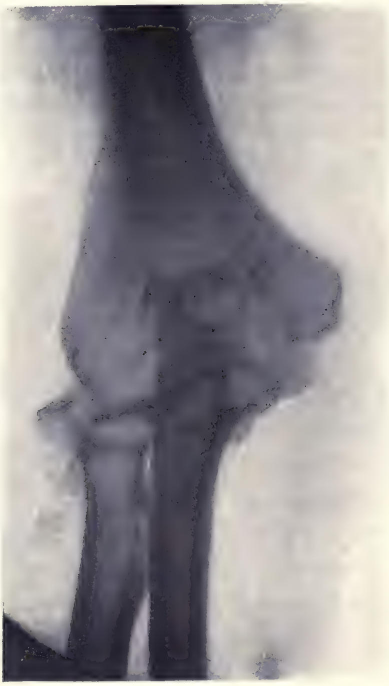

Fig. 126.—Preoperative skiagram showing ascent of internal condyle, descent of external condyle, and fracture of head of radius.

useful position, in case ankylosis should occur. In this case we must perform an extensive operation, and one which exposes the patient to more hazard than would have been the case had the forearm originally been dressed in the flexed position, instead of that of extension. Another advantage of the flexed position is that, by carrying weights, the forearm may be straightened out when released from the flexed position more readily than it can be flexed when released from the extended position.

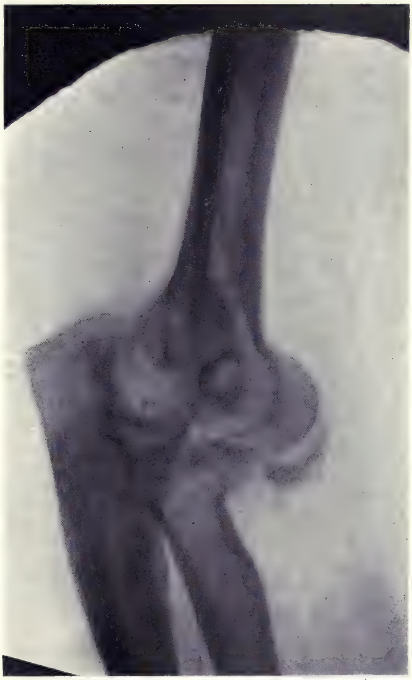

Fig. 127.—Preoperative skiagram showing trochlea displaced backward on shaft and head of radius displaced posterior to capitellum.

When there is a fracture of one condyle through its neck, we always operate—owing to this being a frequent site of non-union, from the presence of compact tissue—performing our method of extra-articular nail-drill-fixation (see Vol. IV, October, 1915, 841–849—diagram of method on p. 846, Fig. 215). We wait, however, until the eighth or tenth day after injury, or until the tissues have had time to coffer-dam themselves against infection. If we do not use a drill cut off short, we employ an iron nail, silver plated, the silver acting as an antiseptic. This method obviates the necessity of compounding the fracture or of entering the joint-cavity; and if the nail should have to be removed, just nick the skin and take it out.

Judging from the skiagram and the results of physical examination, this case may best be dealt with by approaching the joint from behind, retracting the ulnar nerve from its groove, and dividing the triceps tendon in an "L"-shaped manner. The lower end of the humerus must be resected, including the trochlea and capitellum, so that the forearm can be brought forward; and a new intercondyloid notch must be developed for the reception of the greater sigmoid cavity of the ulna. Fascia-fat flaps may be interposed between the ulna and the humerus and the triceps and the humerus, so as to prevent adhesion-formation, and obtain motion to the degree of flexion to a right angle. Exostoses are present from ossification of the fibrous tissue of the capsule. The head of the radius rests entirely posterior to the capitellum. The trochlea has been displaced backward on the shaft (Fig. 127).

OPERATION

[Through a postero-internal incision the ulnar nerve was first encountered: it was involved in a neuroma at the site of contact with a sharp ledge of bone. Upon applying the faradic current the nerve gave a positive reaction, showing that it was not degenerated. The ulnar nerve was freed from its groove and displaced forward; its articular branch to the elbow-joint was divided, in order to diminish the amount of postoperative pain in the joint. A postero-external incision was now made: the head of the radius was found to be fractured, in addition to the fracture and displacement of the condyles. After resecting the condyles and head of the radius, a fascia-fat flap was obtained from the tissues over the outer side of the joint, interposed between the stumps of the condyles and the greater sigmoid cavity, and secured in position by stitching its edge to the remains of the capsule with four catgut sutures. The re-formed neck of the radius adjusted itself into the lesser sigmoid cavity, a portion of the fascia-fat flap intervening. The ulnar nerve was anchored in front by a slip of fascia and fat. The wound was closed with subcutaneous and then cutaneous stitches. No drainage was employed. The elbow was immobilized at right angles by an aluminum splint, and the forearm dressed in supination.]

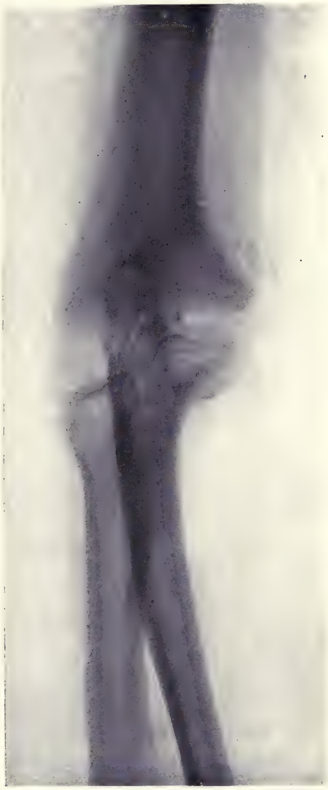

Fig. 128.—Postoperative skiagram showing extent of resection of condyles of humerus. Compare with Fig. 126.

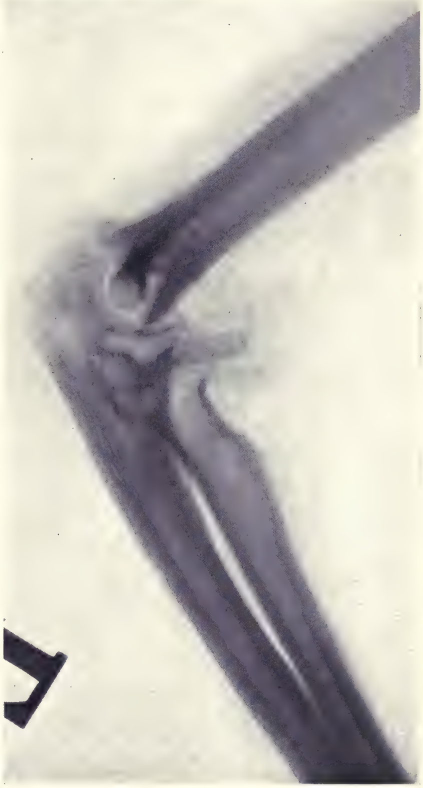

Fig. 129.—Postoperative skiagram showing relation of resected humerus to greater sigmoid cavity of ulna. Compare with Fig. 127.

POSTOPERATIVE COMMENTS

The elbow will be kept immobilized until union of the soft parts has taken place. Do not be in a hurry to begin passive motion before the tissues are firmly healed, lest the flaps should be torn away, callus and limitation of motion resulting. The fifth week is time enough to begin passive motion. It is advisable to inspect the wound at the end of forty-eight hours, however, to see if a hematoma has formed. In bone-work the fate of a hematoma is to undergo fibrous-tissue organization and then ossification, so that in order to prevent this untoward result it is necessary to remove the accumulated blood by aspiration. In joint-work, contrasted with work upon the shaft of a bone, neoplastic bone-formation must be kept down to the minimum, lest motion in the new joint should be blocked by neoplastic bony obstructions: it is for this reason that the periosteum is removed still attached to resected portions of bone, instead of removing the latter subperiosteally; and it is for the same reason that hematomata are aspirated. The forearm is dressed in such a position that a penny dropped from the mouth would fall into the palm of the hand.

What is an arthroplasty? The operative development of a new joint where ankylosis existed previously. What is the principle upon which the procedure is based? The same principle that nature observes in fractures of the shaft of the humerus or femur, when, by interposing muscle or fascia between the ends of the fragments, she prevents union of the latter. If you cannot do as good a job in the interposition of fascia and fat between bone-ends as nature does when a man falls from the window of a five-story building and fractures his femur, you are at least not much of an artist. The best medium for producing non-union is a pedicled flap of fascia and fat, because such a flap is well nourished and therefore maintains its vitality, and by collagen-metamorphosis produces a fluid resembling synovial fluid.

There is nothing impossible about this operation of arthroplasty, notwithstanding the fact that many say it cannot be successfully performed; the only wonder is that when the woods are full of these cases so few surgeons have undertaken the work. It is hard work, to be sure, but at the same time the rewards are sufficiently liberal to warrant the extra amount of labor. The results are now getting to be fairly uniformly good. In the course of the work we have learned many little points of practical value: for example, when performing arthroplasty upon the knee-joint, it is essential to remove not only enough bone, but also the entire capsule before interposing the flap; it is the thickened capsule, with its inflamed and sensitive nerves, that, when not removed, gives rise to pain after arthroplasty upon the knee-joint. If you have ever operated upon a case of pseudarthrosis of the femur you are well aware of the colossal strength of the new capsule that has been formed at the site of the pseudarthrosis: from this we learned that nature forms new ligaments after an arthroplasty operation.

An arthroplasty of the knee requires superlative general, surgical, technical management. It is not an operation to be undertaken by a novice or one who has not taken pains to work out the mechanical details on the cadaver. The results in so many of these cases have been so superlatively satisfactory that it proves beyond controversy that the principles underlying the arthroplasty are correct. This does not relieve the operator from the responsibility of defects in technic. I should say that the technic is not difficult to acquire, but a man must regard himself of superhuman clay who will attempt to do what I consider the most exacting technical operation of all surgery, without specifically preparing for the execution of the task. A removal of the Gasserian ganglion or its roots is vacation exercise when compared with an arthroplasty of the knee. What genius could construct a good-looking and well-fitting shoe without an apprenticeship to a shoemaker?

Postscript (*December 17, 1915*).—It is now three months since the operation was performed. There is very good motion in the elbow-joint, and the range will be increased as the muscles are gradually exercised more and more (Figs. 128 and 129).

ANCIENT T-FRACTURE OF HUMERUS—RESECTION OF ELBOW-JOINT—ARTHROPLASTY

Summary: Clinical history of patient; comments—baneful effects of early forced passive motion in joint-fractures; beneficial effects of slight motion at fragment-ends in fracture of the shaft of a bone; operation—regard for ulnar nerve and epiphyseal line; resection of humerus; interposition of fascia-fat flaps; postoperative comments—the question of a flail-joint after resection; manner of dealing with ulnar nerve.

CLINICAL HISTORY OF PATIENT

A MALE, thirteen years of age, was admitted to Mercy Hospital September 3, 1915.

Twenty-nine months before admission, in April, 1913, while roller-skating, the patient fell backward, landing upon the left elbow: there was no abrasion, and no marked swelling followed the injury; but slight pain was complained of in the elbow.

Ten days after the accident the attempts of a physician to reduce the deformity of the elbow produced very severe pain in the joint, sharp and burning in character, and signs of inflammation appeared—swelling and redness, which soon disappeared under fomentations.

During the next six months the elbow was treated by gentle passive motions, but without effect.

During the past year the elbow has assumed the position of 100 degrees of flexion, *i. e.*, almost a right angle, although it is not ankylosed, for a limited degree of extension is possible (5 degrees): the functions of pronation and supination are preserved; swelling, tenderness, and pain are absent.

Examination by Dr. Murphy (September 4, 1915).—A study of the skiagram reveals that the point of the olecranon process and the tip of the internal epicondyle are in normal relationship, but that the external condyle is fractured and displaced forward away from the head of the radius, which is, therefore, subluxated from the capitellum; the internal condyle, too, is fractured and displaced slightly forward. There is a T-fracture of the lower end of the humerus: the forward displacement of the external condyle blocks flexion by abutting against the upper end of the radius; while the forward displacement of the internal condyle blocks flexion by abutting against the tip of the coronoid process. There is not, however, a complete bony ankylosis.

COMMENTS

Dr. Murphy (September 8, 1915): How much motion is there in the elbow-joint?

Intern: The elbow is flexed, and there is a range of flexion and extension of only about 5 degrees.

Dr. Murphy: The range of motion is so slight that it is scarcely appreciable: in fact, the first impression is that bony ankylosis is present.

From the accident the patient suffered a T-fracture of the lower end of the humerus, with forward displacement of the condyles—the external to greater extent than the internal. After the accident the injury was treated by forced passive motion, with the dubious object of insuring ultimate mobility: so nebulous are the chances of obtaining mobility by such a method that the following epigram may be formulated: "*Forced motion immediately following a fracture of the elbow-joint assures ankylosis.*" The evils of early forced motion of a fractured joint have been sufficiently dwelt upon (Vol. IV, October, 1915, 856): the successive sequelæ of tissue-laceration, hemorrhage, organization of hematoma, cicatricial tissue, and ankylosis must by this time be well understood. If, on the contrary, the joint is immobilized until all tissues have healed, then—and then only—it is quite proper to institute slowly increasing graded, passive motion, never to the extent, however, of giving rise to pain.

Whereas any excess of callus beyond that necessary for bony union is undesirable in the case of a fractured joint, the opposite obtains in the case of a fracture of the shaft of a bone: here plenty of callus is wanted to insure firm union but no motion; therefore, absolute immobilization during healing is just as undesirable in the case of the fractured shaft as it is desirable in the case of the fractured joint, for the irritation consequent upon motion is a powerful stimulator of osteogenesis; this is the principle upon which the late Lucas-Championnière advocated the treatment of fractures by mobilization, and that it is well-founded is shown by the great increase in the number of cases of non-union since the introduction of gypsum splints and Lane plates as immobilizing agents. During the twenty months when I was an intern at the Cook County Hospital I saw but one case of non-union out of hundreds of cases of fracture which were treated, before plaster-of-Paris came into vogue, by fracture-boxes, etc.

OPERATION

In exposing the elbow-joint the usual care must be taken to avoid injury to the ulnar nerve; and, in addition, because the patient is still in the epiphyseal age, the plane of the epiphyseal cartilage must not be encroached upon, although this is an affair of less importance in the lower than the upper humeral epiphysis, for it is from the latter that the bone obtains its main growth. [Incision made on both sides of olecranon process, as for arthroplasty.] . . . We prefer this type of lateral approach to that by a transverse incision, for there is less liability to necrosis of the tip of the flap. [Retracts edges of mesial incision and exposes ulnar nerve.] . . . You can see the ulnar nerve shining in the field: it is fully exposed, and I shall retract it out of harm's way, since it would be a misfortune if ulnar paralysis should arise as a sequel to this operation. We encounter the anastomotica magna artery in the transverse portion of its course behind the lower end of the humerus, just above the olecranon fossa, and immediately ligate and cut it in order to diminish the amount of postoperative bleeding.

Exposure of the site of fracture reveals fibrous union alone, as we had judged previous to operation: there is a fibrous band which firmly binds the olecranon-tip to the humerus at the site of fracture, and it is evident where the olecranon-tip strikes against the deformed olecranon fossa during extension; excessive callus has developed at this site, accounting for the five-degree range of motion and showing the therapeutic futility of passive motion. [Severs fibrous band, resects olecranon-tip and a part of internal condyle, and scoops hyperplastic bone out of olecranon fossa, leaving a raw, bony surface.] . . . In order to prevent the triceps tendon from becoming adherent to this raw surface of the humerus in and about the olecranon fossa, I am interposing a flap of deep fascia from the triceps sheath between the tendon and the posterior surface of the lower end of the humerus. . . . I am now shifting the ulnar nerve from its groove behind the internal epicondyle to a permanent position before the epicondyle, so that it will not become involved in cicatricial tissue. . . .

[Retracts edges of lateral incision, exposing radiohumeral joint.] . . . Turning our attention toward the external condyle, we find the capitellum displaced so far forward that it interferes with flexion; it is necessary, therefore, to resect it, but without encroaching upon the cartilaginous epiphyseal line. . . . It now remains to interpose fascia-fat flaps between the arm and forearm components of the elbow-joint in such a manner that no raw, bony surfaces will be left remaining at the completion of the operation. . . . [Closes wounds without inserting drainage.]

POSTOPERATIVE COMMENTS

The arm will be dressed upon two pillows with the hand and forearm erect, so as to prevent the occurrence of edema. The nearthrosis will be immobilized until the soft tissues have united, and passive motion will be begun at the end of three or four weeks and increased by slow gradations: if the patient is told to move the joint himself, you may rest assured that he will not exercise it to a degree that is detrimental either to the process of repair or to the subsequent attainment of mobility.

After resection of the elbow by the subperiosteal and subcortical methods it is rarely that a flail-joint occurs, provided that the contour of the greater sigmoid fossa has been preserved and finds a site of lodgment against the lower end of the humerus:

in fact, the common error in performing resection of the elbow is that of removing too little, rather than too much, bone; by clearing the soft tissues from the bones subperiosteally (Langenbeck), subperiosteosubcapsularly (Ollier), and subcortically (König and Tiling), the muscular and ligamentous attachments are preserved and union occurs more rapidly and securely. After resection the bone-ends are held in apposition by the intact biceps and brachialis muscles before, the triceps insertion into the deep fascia of the forearm behind, and the rapid reattachment of periosteum, capsule, and cortical shell bearing the unseparated muscles, tendons, and ligaments. In the case of the knee-joint, however, since we are dealing with a weight-bearing joint which depends for its strength upon the integrity of the ligaments—especially the crucial—a flail-joint is much more liable to result from resection, unless special methods—*e. g.*, the concavoconvex—be adopted.

A matter of great importance in elbow operations is to have due regard for the ulnar nerve, first, by not injuring it, and secondly, by transferring it to a sheltered position before the internal epicondyle, where it is retained by a strip of fascia and fat, which is drawn across it and tacked to the tip of the epicondyle: should the nerve be left in its exposed position behind the epicondyle it would be subject to compression by the postoperative cicatricial tissue, bound in its groove and irritated during every movement of flexion and extension, with the result that a neuroma would develop, just as occurred in the case which we showed you last Saturday (Vol. IV, December, 1915, Figs. 289–290, pp. 1104–1105).

Postscript.—There was primary union and the patient left hospital at the end of four weeks.

ANCIENT FRACTURE OF ELBOW-JOINT WITH ANKYLOSIS—RESECTION AND ARTHROPLASTY. TALK ON TECHNIC OF ARTHROPLASTY OF ELBOW-JOINT

Summary: Clinical history of patient; comments—review of case; plan of operation; operation—isolation and testing of ulnar nerve; resection of both condyles and of elongated coronoid; arthroplasty; talk on technic of arthroplasty of elbow-joint.

CLINICAL HISTORY OF PATIENT

A FEMALE, twenty-seven years of age, was readmitted to Mercy Hospital September 21, 1914. (The following history is extracted from Vol. II, December, 1913, 979–987.)

When five years of age (1892) the patient fractured the left elbow by falling into a six-foot hole: the joint was immobilized with such good results that when the treatment was terminated, the patient could readily bring her fingers to her mouth.

Three years later the patient refractured the elbow by falling: the limb was immobilized in extension. After the treatment was terminated a fair degree of motion resulted, but nine months before admission (May, 1913) the range of motion became more and more limited, pain appeared in the joint, and an enlargement below and before the external condyle. A skiagram taken at this time revealed anterior luxation of head of radius and elongation of the coronoid process.

At the *first operation*, on May 10, 1913, the head of the radius was resected at the neck, but the elongation of the coronoid process was not disturbed for fear of transverse union of the two raw bony surfaces which would have been established.

At the *second operation*, on June 26, 1913, the elongated coronoid process was removed because it prevented full flexion. An incision was made parallel with the anterior portion of the internal supracondyloid ridge; the brachialis muscle was encountered and elevated; the operator gradually progressed anterior to the capsule until he encountered the coronoid process; with a straight chisel the latter was removed at its base *together with its periosteum;* the contracted posterior portion of the capsule was stretched slowly by a series of interrupted flexions. Three weeks after the operation there was almost complete extension and flexion to beyond a right angle.

The *third operation* was performed on April 23, 1914, owing to a return of the trouble: there was found an elongation of the cervical stump of the radius to the extent of one-half inch; this elongation was removed, but the coronoid process was not attacked. In manipulating the limb into position for the dressing the external condyle was inadvertently fractured, but was immediately nailed: the limb was dressed in the position of flexion to almost a right angle. The patient left hospital on May 7, 1914.

At the time of discharge from hospital the patient was able to bring the palm of the left hand up to the chin and nearly fully extend the forearm: this range of motion was retained for over two months,—until July 15, 1914,—when it began to diminish; pain has been almost constant since leaving hospital.

At present the elbow is the seat of bony ankylosis in the position of slight flexion.

COMMENTS

Dr. Murphy (September 23, 1914): This patient's fracture-history is of twenty-two years' duration: it narrates the story of chronic recurring bone-hyperplasia—of how first the head of the radius was resected but, like the mythologic hydra, grew back again; secondly, the elongated coronoid process was removed and it, too, grew back again; and finally the reformed radial head was removed. At present there is practically complete bony ankylosis, and the coronoid process is still elongated: we purpose, therefore, to resect the deformed elbow and perform arthroplasty, trusting that this final operation will ultimately cure.

OPERATION

[Constrictor applied to arm; vertical incision made one-half inch mesial to olecranon process; tissues retracted.] . . . The first step is to isolate and free the ulnar nerve from its groove behind the internal epicondyle: freed, it may be shifted from one to other side as the progressive manipulations require. In this part of its course the nerve supplies the elbow-joint with an articular branch. The nerve may have been injured in the execution of the previous operations, or entangled in the cicatricial tissue resulting therefrom: I shall determine its power of conductivity by applying the faradic test. [Applies faradic excitor: muscles contract, proving that nerve is intact.] . . . We must now resect the internal condyle. . . .

[Vertical incision made one-half inch lateral to olecranon process: tissues retracted, exposing radiohumeral joint.] . . . Motion is preserved in the radiohumeral joint. We encounter the origin of the extensor muscles from the external epicondyle and must avoid injuring the musculospiral nerve in its course between the brachioradialis and brachialis muscles: the landmarks are obscured from the cicatricial tissue. [Resects external condyle; working subcapsularly, clears off cicatricial anterior portion of capsule of elbow-joint, retracts and exposes elongated coronoid process (Fig. 130).] . . . You can see the elongated coronoid process projecting forward into the tissues of the antecubital fossa and limiting flexion by encountering the coronoid fossa of the humerus too soon in the stage of flexion (Fig. 130, *B*). In dealing with this viciously situated process I must remove the periosteum with the process lest the process should reform: it reformed before, despite the removal of the periosteum; at the same time I must be careful when clearing the soft tissues from the periosteum of the process not to injure the brachial artery and median nerve, which are in such close relationship with the process. It is far easier to work subperiosteally than *epi*periosteally: by making a spreading dissection in the plane of attachment of the soft tissues to the periosteum, however, I find that I am able to expose the process still covered by periosteum down to its base: I must now saw through its base in the radius of the greater sigmoid fossa and at the level of the neck of the radius (Fig. 130, *B*). . . . It remains to restore a trochlear surface on the lower end of the humerus for the play of the greater sigmoid cavity. . . . (Fig. 130, *B*).

This patient's elbow-joint has manifested a strong tendency toward hyperplasia of bone with consequent ankylosis: by carefully removing the periosteum with the resected portions of bone we hope to overcome the former; while the latter will be prevented by interposing flaps of fascia and fat, in accordance with our knowledge of the etiology of pseudarthrosis after fracture. The flaps consist of the deeper portion of the subcutaneous tissue and the underlying adherent deep fascia: to expose the flap-tissue it is necessary to dissect back the skin from the edge of the operative incision, and in this maneuver care must be taken to leave a certain amount of fat attached to the skin, lest its vitality should be impaired. In arthroplasty of the elbow the interposing flap for the radial side of the joint is obtained from the most convenient site—here the sheath of the brachioradialis muscle; while that for the ulnar side is gotten from the sheath of

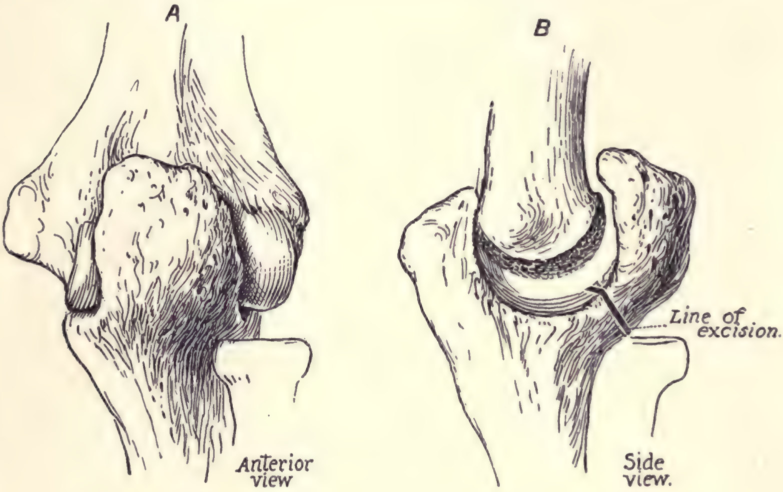

Fig. 130.—Elongated coronoid process and method of dealing with it.

the biceps or the triceps muscle: the bases of both flaps are directed upward. [Flaps outlined, elevated, swung around into their respective joint-side until their tongues overlapped, and secured on all sides by fine chromicized catgut sutures borne by a Reverdin needle; ulnar nerve replaced in its groove, muscles reattached, deep fascia and superficial fascia stitched together to relieve skin of tension, and skin-edges apposed by horsehair sutures: no drainage inserted; constrictor removed.] . . .

The elbow will be dressed at a right angle, in order to minimize the degree of tension. In such cases there is some danger of necrosis of the skin: should it survive, however, a good result may be expected.

Postscript (April 29, 1915).—It is now over seven months since the operation was performed; there is perfect motion in the elbow-joint.

TALK ON THE TECHNIC OF ARTHROPLASTY OF THE ELBOW-JOINT

After the usual preparation of the field of operation an Esmarch constrictor is applied high up on the arm. Formerly I made a vertical incision on the posterior surface of the arm, directly over the olecranon process: I have since abandoned that procedure, because of the fact that the contraction of the scar often interfered with free motion in the joint. I now make two lateral incisions, one on either side of the olecranon—although only one incision may be necessary, varying with the possibility of working freely through an external incision without injuring the ulnar nerve.

If there is any danger of inflicting injury on this nerve the second or internal lateral incision should be made: I always insist on finding the nerve, freeing it from adhesions, and retracting it from the field of operation.

The length of this lateral incision will depend on how much of an area one wishes to expose: as a rule, an incision about 6 inches in length is sufficient, although there is no reason why it should not be made longer if necessary. The incisions are made about one-half of an inch to either side of the olecranon, and extend through the skin and superficial fascia: the edges of the wound are then retracted widely so as to give easy access to the joint.

The interposing flaps are taken from the aponeurosis of the brachioradialis and from the fascia and fat on the inner side of the joint: the bases of these flaps are directed upward. The flaps are made wide enough to cover the freshened surfaces of bone and long enough to extend across from one side of the joint to the other.

In the case of the elbow the ankylosis usually involves the humero-ulnar component of the joint: it is carefully divided by means of a curved chisel, which is twisted laterally, until free mobility of the joint is secured. In our earlier work I thought it advisable to separate the olecranon with its triceps-tendon attachment and retract it upward so as to expose the interior of the joint: I no longer find this necessary except in unusual cases.

Sometimes bony ankylosis involves the superior radio-ulnar joint: it, too, is chiseled free, all exostoses are cut away, and absolute freedom of motion is secured. If necessary, the olecranon fossa may be deepened, so that the extension of the elbow may be complete. Ample bone should be removed from the humerus and radius to permit of free flexion and extension *without force*, and the anterior portion of the joint-capsule should be fully and completely divided.

Having secured the desired range of mobility of the joint and freshened all bony surfaces, the next step in the operation is to interpose the flaps between the prepared bone-ends and secure them on all sides with fine chromicized catgut sutures. The ulnar nerve, which was early exposed to avoid injuring it, is now replaced in its groove and surrounded by fat: in certain cases it is advisable to transfer the nerve permanently to a position before the internal epicondyle. The wound is closed without drainage, dusted with powder, and dressed.

The elbow is immobilized at a right angle, and a posterior and lateral three-fifths circular gypsum case is applied. At the end of from five to seven days the case is removed twice a day, and passive motion is instituted: at the end of ten days it may be removed permanently, and the arm may be carried in a sling.

The patient is encouraged to make active and passive motions and, if necessary, is ordered to carry sand-bags or other weights for the purpose of securing as much extension of the elbow as is possible. Massage may now be of service in increasing the function of the joint. Extension and flexion should never be forced under gas anesthesia. Forced motion should never be pushed to the extent of causing severe pain, nor should it be prolonged.

[Arthroplasty of the elbow-joint has been reported in the following numbers: Vol. I, August, 1912, 523–536; October, 1912, 749–759; December, 1912, 833–841; Vol. II, December, 1913, 999–1010; Vol. III, October, 1914, 1027–1034—full page illustrations of technic; Vol. IV, October, 1915, 851–862—flap placed over scooped-out greater sigmoid fossa.]

POSTSCARLATINAL ARTHRITIS OF ELBOW—ASPIRATION AND FORMALIN INJECTION

Summary: Clinical history of patient; comments—varying degrees of virulence manifested by postscarlatinal arthritis—illustrative case; nature of lesion; operation—aspiration and formalin injection; prognosis.

CLINICAL HISTORY OF PATIENT

A MALE, ten years of age, was admitted to Mercy Hospital April 30, 1916.

The patient complains of trouble in his left elbow. About seven weeks ago—on March 11th—he was taken ill with a sore throat: twenty-four hours later a rash appeared—first around the clavicles, whence it spread downward along the torso to the legs, which it reached within a few hours; fever developed and rapidly became high, and a diagnosis of scarlet fever was made. The disease pursued the usual course, desquamation being completed by the end of six weeks.

On the *tenth day* of the illness the patient experienced a slight *chill:* his temperature rose about two degrees above the usual readings, and *severe pain* shot into his left elbow; the latter began to swell, deep redness appeared, and the pain increased in intensity. By way of treatment the elbow was immobilized in the position of extension, and salicylate of soda was administered until desquamation had entirely stopped and the house had been fumigated.

Two weeks after the termination of the process of desquamation the patient was brought to hospital.

COMMENTS

DR. MURPHY (May 2, 1916): Cases of postscarlatinal arthritis vary greatly in their degree of virulence: in some the articulation is destroyed rapidly; in others, slowly. I recall a case which I treated thirty years ago for this malady: the hip-joint was involved; it was opened immediately and washed out with 5 per cent. phenol. The late Dr. Fenger was associated with me in this case. *No drainage was inserted.* Rapid resolution took place, and the patient has not had the slightest trouble with this hip since. I saw her yesterday (June 15, 1916).

In this patient the left elbow-joint is apparently ankylosed: there is an accumulation of pus on the inner side of the elbow, but no particular distention of the joint itself. The first step in the treatment is to cure the infection underlying the joint-trouble. [Aspirates the joint and injects it with 2 per cent. formalin in glycerin.] . . . Judging from the advanced degree of involvement of this joint we cannot hope to conserve it, since too long a time has elapsed between the lodgment of the metastatic infection in the joint and the time of the injection.

In scarlatinal infections it is not uncommon to have metastatic infections of the streptococcic type in the joints; that is, inside the fibrous capsule. The joints are involved clinically more frequently than the bones in scarlatina, the bones more frequently than the joints in typhoid. The whole fibrous tissue is metastatically involved more frequently in typhoid than in scarlatina, but it is not as dangerous a lesion. It is in the white fibrous tissue that the metastasis takes place in the joint; it is in the vascular and lymphatic subendothelial area in which the septic emboli are arrested. The formalin injection into the joint should be made within forty-eight hours after the metastasis occurs. It may need to be repeated once and probably twice. There is nothing gained by delay in this class of cases, and prolonged delay leads to disaster as far as the joint is concerned. The formalin and glycerin treatment has a decidedly beneficial effect in the acute purulent metastatic infections of the joint. The creasote-guaiacol-iodoform-olive-oil emulsion should be reserved for the tuberculous arthritides.

The pus aspirated from the pocket showed streptococci.

TUBERCULOSIS OF ELBOW—PROGRESS UNDER TUBERCULIN THERAPY WITH EVENTUAL CURE

Summary: Clinical history of patient; associated lesions—tuberculous tenosynovitis of extensor tendons of wrist and peroneal tendons; notes showing progress of case to eventual cure.

CLINICAL HISTORY OF PATIENT

A MALE, six and one-half years of age, was admitted to Mercy Hospital June 11, 1913. The family history reveals tuberculosis on both sides of the family. The patient is the elder of two children, and was born at full term by a normal delivery. In April, 1911, he had German *measles*, followed by the development of "whooping" *cough*, which *lasted throughout the entire summer*. The paroxysms of coughing were so severe that he often vomited food after ingestion.

In July, 1911, while the cough was at its height, the patient's parents noticed a nodular swelling on the back of his right wrist, which was slightly sensitive to pressure.

Several weeks after the appearance of the first swelling the same condition was noticed on the left wrist: two weeks prior to this the patient fell from a high chair, but it is not known how he struck, and he was not incapacitated by the fall.

In October, 1911, the parents noticed stiffness and soreness in the patient's right elbow, which have persisted to the present time, and now the elbow is painful on both extension and flexion, and he cannot supinate the forearm.

The day before admission the parents noticed a swelling on the outer side of the left ankle.

In the beginning of the joint trouble the patient was subjected to osteopathic *manipulations* of elbow and wrist, two or three times a week, and the elbow *became progressively worse*.

TREATMENT AND PROGRESS

On June 11, 1913, a tuberculin test proved positive; treatment was begun by Dr. Murphy: a gypsum case was applied to the right elbow, and the syrup of the iodid of iron and therapeutic doses of tuberculin were ordered.

On October 22, 1913, examination showed a fair degree of motion in the joint and the absence of intra-articular effusion. A tin splint was substituted for the gypsum case, and the iron and tuberculin were ordered to be continued.

On January 21, 1914, the elbow was found much improved: the left wrist and left ankle, however, which were involved by tuberculous tenosynovitis of, respectively, the extensor tendons on the dorsum of the wrist and the peroneal tendons behind the malleolus, were worse. To the syrup of the iodid of iron were added maltine and emulsion of cod-liver oil. The tuberculin was continued.

On May 21, 1914, the elbow was much improved, but still enlarged. The treatment was continued as before.

On September 9, 1914, it was learned that the patient had had one severe reaction from the dose of tuberculin which was administered in June: since that time, however, the temperature has been below 100° F. The medication was continued as before.

On January 6, 1915, examination revealed much improvement in the condition of the elbow, and permission was given the patient to work the elbow a little. Over the left fibular malleolus there was found a cold abscess, which had not, however, pointed and discharged. It was ordered that the patient be kept off his feet: he need not, however, stay in bed all the time, but must walk on crutches.

On May 14th the thickening had entirely disappeared from the elbow, and the latter looked remarkably well. The abscess about the left ankle appeared to be in the peroneal tendon-sheath, running forward around the fibular malleolus and following the line of the peroneal tendons: it felt as though the sheath contained rice-bodies, or perhaps a loose piece of cartilage from the malleolus itself. The tuberculin was ordered to be continued.

On September 9th practically no discharge from the elbow was demonstrable: all the thickening about this joint had disappeared, and cure by cicatrization was proceeding without interruption. The left ankle showed the presence of rice-bodies in the peroneal tendon-sheaths, but no pus. The elbow-splint was set at a right angle. The patient was now permitted to wear his ordinary shoes. The tuberculin therapy was ordered to be continued.

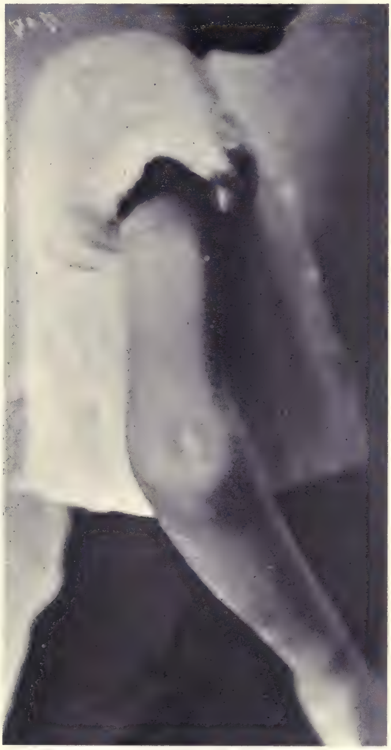

Fig. 131.—End-result in tuberculosis of elbow under conservative treatment. Sinus completely closed. (May 4, 1916.)

On May 4, 1916, the latest note was recorded. The thickening about the right elbow had disappeared, and free motion was present within a range of from 7 to 10 degrees. The forearm was a little pronated, but not fixed in that position, for a limited range of rotation of the radius could be effected. The sinus was completely closed (Fig. 131). The elbow-splint was discarded. The patient was practically well, but was ordered to continue the tuberculin therapy for another year. At this date the ankle and wrist swellings had entirely disappeared.

(For the mode of administration of tuberculin as used in this clinic consult Vol. II, December, 1913, 941–2.)

PRIMARY SYNOVIAL TUBERCULOSIS OF ELBOW-JOINT—RESECTION—ARTHROPLASTY

Summary: Clinical history of patient; comments—discussion of differential diagnosis between syphilis, tuberculosis, sarcoma, and metastatic arthritis; treatment of joint-tuberculosis in children *vs.* adults; operation—precautions to be observed in applying constrictor to arm; primary synovial tuberculosis of radiohumeral joint found; reinfection of soft tissues; resection and arthroplasty.

CLINICAL HISTORY OF PATIENT

A MALE, twenty-four years of age, was admitted to Mercy Hospital August 30, 1915. The family history does not reveal tuberculosis or malignancy. The patient suffered an attack of pneumonia one year ago. There is no history of the venereal diseases.

Seventeen months ago, in April, 1914, the patient noticed a sensation similar to needle-prickings in the olecranon region of the right elbow. A month later this sensation disappeared, but the elbow became very painful and swollen. The dull aching became more pronounced and within three months had extended to the wrist. Two months later the pain left the wrist, localized in the elbow, and became intensified: it is severer by night.

During the fall of 1914, so severe was the pain that the patient found it impossible to rotate the forearm. The motion in the elbow gradually became more and more limited until two months ago, July 1, 1915, by which time the elbow became completely ankylosed and flexion of the forearm by external force caused pain. Sensation and motion of the fingers are unimpaired. Since the beginning of the trouble the forearm has gradually increased in size.

COMMENTS

DR. MURPHY (September 7, 1915): This elbow-disease was not preceded by trauma; and without trauma the question arises, What is the nature of the lesion?

The patient is twenty-four years of age—the common age for tuberculosis. There is no history of venereal disease: the Wassermann test was negative. In the active stage of a disease—whatever it may be—a negative Wassermann reaction gives fairly good assurance that the lesion is not specific. To be sure, the commonest lesion in the elbow-joint is tuberculosis, but the patient presents no history of tuberculosis, nor is the clinical course of the disease typically indicative of tuberculosis. The history is negative except in one respect—the gradual increase in the severity of the symptoms, which began with a slight pricking sensation and gradually increased to frank aching; while accompanying the increase in pain there was a progressive decrease in the range of motion, and at present practically no motion is obtainable in the joint,—what slight motion there is is painful,—but there is no bony ankylosis.

Owing to suspicions of tuberculosis having been aroused, the tuberculin test was applied, but proved negative. Here is an instance where the tuberculin test should be positive, because the disease is in the active and not in the passive state; the fact that the test is negative, however, is of but comparative value, because a negative reaction occasionally occurs in the presence of tuberculosis, so that the disease cannot be excluded by the negative reaction. When the tuberculin test is positive, however, its diagnostic value is much greater than its value when negative.

Aspiration of the joint was negative—at least nothing came through the needle which was used. The skiagram reveals that the greatest change is at the radiohumeral joint—that is, in the region of the external condyle, where there is a zone of marked porosity as large as a silver dollar, involving both the external condyle and the head of the radius. So, too, most of this patient's symptoms were referred to the radiohumeral articulation, for that is where he complained of pain, and voluntary pronation and supination caused greater pain than passive attempts at flexion, and he has held the joint so guardedly fixed that active flexion, too, has become painful.

Taking all these factors into consideration, the next question arises, Is this a sarcoma? The whole forearm is markedly and uniformly enlarged, but sarcoma should begin in either the radius or the humerus, and not spread across the radiohumeral joint to the radius until both are involved in the disease, as the skiagram shows the situation to be, since the increased porosity of the ends of both bones is almost equal in extent. Furthermore, according to the skiagram no great change in density of the type that one sees in sarcoma is manifest anywhere in the bones, so that we may exclude sarcoma.

So far in the differential diagnosis we have excluded positive evidence of syphilis, tuberculosis, and sarcoma; while as for metastatic arthritis virulent in onset, the history revealed no focus of infection—nothing to indicate an attack of such severity as attends acute metastatic arthritis, when patients are incapacitated within a few hours—always within a couple of days. There is, however, the chronic variety of arthritis, where the primary focus resides in the teeth and alveolar processes, and in which the manifestations are very slow in onset, incapacitating patients, as occurred in this case, but extending over a course of two or three years before putting the patient practically out of commission.

All these factors considered, however, the percentage of chances is enormously in favor of tuberculosis, notwithstanding the negative response to tuberculin and the negative history: we are therefore attacking the joint on the basis that it is involved in tuberculosis.

In a patient of his age (twenty-four years) the expectant treatment is contraindicated, but resection should be advised. Before deciding upon such a radical step, however, it is wise first to expose the articulation, examine its condition, and establish the diagnosis from the gross appearances. When I was an intern in the Cook County Hospital, one of the prevalent operations was that of excision of the elbow-joint for tuberculosis, which today is warranted in adults, while in children the expectant plan is the thing.

If the lesion prove tuberculous, the after-treatment is an important factor in obtaining a useful joint; and if tuberculous, within a few days after the operation the patient will be treated by x-rays locally, and in addition by subcutaneous therapeutic injections of tuberculin.

OPERATION

Owing to the presence in the upper arm of the musculospiral nerve, care must be taken in applying the constrictor, which should be flat and spread over a large area. Constriction by a round tube may injure the nerve to the extent of producing ischemic contracture, so that by the time the patient comes out of the anesthetic state the conditions have already been in operation, by which typical Volkmann's contracture develops, and it takes weeks—even months—for the effects of such tight constriction to disappear. If the round tube causes severe trauma to the nerve (laceration), then a deposit of fibrous tissue in the nerve may ensue, and occasionally the permanent suspension of transmission of impulses by the axons.

[Bilateral incisions for exposure of joint.] . . . In cutting through the soft tissue to the bones we wish to keep well out of harm's way both the radial and the posterior interosseous nerves, which are the terminal branches of the musculospiral nerve. [Incises synovial membrane.] Appearances suggest that this is a fungoid tuberculosis, such as occurs when the patient has little or no resistance. Note the typical *brie* coming from the joint. There is the head of the radius, which, of all the joint structures, is most involved by the disease. The diseased joint-capsule has burrowed around in all directions, carrying the tuberculous process here, there, and everywhere.

That is a rare condition in the synovial membrane. It is rare that tuberculosis involves the synovial membrane of the radiohumeral joint: it more commonly begins in the greater sigmoid cavity and then burrows to other parts of the joint.

Here is the olecranon process: there are the lateral ligaments. The joint-cavity still contains a very large quantity of material that did not escape through the incision. Note the enormous infiltration! It would be advantageous if we could resect this joint without making another incision, in order to avoid the danger of tuberculous reinfection of the soft tissues, which here have little or no power of resistance. The synovial membrane of the lesser sigmoid cavity is also involved.

The lesion here is typical of primary hypertrophic synovial tuberculosis: why the diagnostic injection of tuberculin did not provoke a positive reaction is problematic. The joint-capsule is so loosened that it falls off the bone: this, also, is typical of this variety of tuberculosis.

The process began in the greater sigmoid cavity, for here the cartilage is most extensively destroyed, while the pus which wells up from various pockets indicates mixed infection. We wish to resect enough of the joint to permit of flexion of the forearm as well as to remove the synovial lining of the joint (synovial arthrectomy) and still retain some degree of motion. [Resects internal condyle.] . . . Right at that spot—behind the internal epicondyle—is the ulnar nerve lying in its groove, so that I must change the direction of the chisel. [Performs erasion of greater sigmoid cavity of ulna and resects head of radius.] . . . We are now mopping the field with the old-fashioned 5 per cent. phenol. [Flap of muscle and fascia interposed between ends of bones: latter adjusted in their proper relationship with each other.] . . . The slight oozing readily stops. The limb will be dressed with the forearm at a right angle.

RECAPITULATION

Let the record show that the lesion was one of primary synovial tuberculosis which had loosened the articular cartilage of the three bones of the joint, and which had burrowed in various directions, the tissues offering but slight resistance to the spread of tuberculosis; that the ends of the bones were resected and a flap of fascia and muscle was interposed between them—a form of arthroplasty differing from that which is performed to establish a movable joint in the excision of the pathologic products; that the head of the radius was resected; that erasion of the articular surface on the greater sigmoid cavity of the ulna was performed; that all the operative steps were executed without hand-contacting; and finally that the joint was dressed at a right angle.

POSTOPERATIVE COMMENTS

Our first aim is to bring about repair of the tuberculous process, and when complete healing has taken place, we can perform arthroplasty. If, however, that interposing flap of fascia and muscle should survive—as it often does—we shall not have to perform arthroplasty.

Beginning from the sixth to the tenth day after operation the patient will be treated by high tension *x*-rays; and beginning from the twelfth to the fifteenth day, by subcutaneous therapeutic injections of tuberculin. It may be necessary to aspirate the joint to remove fluids accumulating after operation: the stitches were placed far enough apart, however, to permit the escape of any fluid that may accumulate.

Postscript.—There was primary healing of the soft parts. Examination some months later showed that the patient had an excellent degree of flexion and extension and a very serviceable arm. The tuberculous process was entirely eradicated.

CICATRICIAL FIXATION OF ULNAR NERVE FROM ANCIENT CUBITUS VALGUS—RELEASE AND TRANSFERENCE TO NEW SITE

Summary: Clinical history of patient; comments—dialogue with intern on nerve-supply of muscles of hand; nature and extent of paralysis and outlook if unrelieved; similar lesions; operation—release of ulnar nerve and transference from its groove behind to before internal epicondyle; postoperative comments—prognosis of restoration of nerve-function and of muscle-function; use of the faradic and the galvanic current.

CLINICAL HISTORY OF PATIENT

A MALE, thirty-four years of age, farmer, was admitted to Mercy Hospital April 25, 1916.

The patient complains of wasting of the right hand; of inability to extend completely the fourth and fifth fingers at the proximal interphalangeal joint; occasionally of a slight pain behind the elbow and along the ulnar side of the forearm; and of interference with the circulation in the hand and forearm when the elbow is bent in certain positions—that is, the hand feels "as though it were asleep." In the spring of 1888—when seven years of age—he was thrown from a horse, striking the right elbow against a rock; the lower end of the humerus was fractured, and the distal fragment was displaced downward and forward. The fracture was reduced an hour after the accident and the arm placed in a sling: the patient does not recall in what position the elbow was placed, but passive motion was soon begun, and he carried a weight in his hand to provide traction and prevent stiffness. There is a scar on the ulnar side of the forearm just below the elbow, but the patient states that the fracture was not compound, and that no infection ensued. After the fracture healed the patient began to use the limb and has had good use of it since. There is no shortening of the arm.

The right shoulder has been luxated twice, the first time by a fall in 1906: the luxation was reduced, and the reduction was maintained by adhesive-plaster straps and a sling; the patient began to use the arm two weeks later. Two months later, while the patient was climbing down a ladder, as the right arm reached the vertical position just before leaving the rung above, the shoulder again became luxated; the same treatment was instituted, and in a few days all the soreness left. On both occasions the luxation was of the subcoracoid variety. There was no history of circulatory or nervous disturbances at the time the luxations occurred, or immediately following them. When the patient sleeps upon the right side, the shoulder gets sore, and the ulnar side of the forearm and the hand feel numb.

Six years ago (1910) the patient noticed for the first time slight relative weakness in the muscles of the fingers of the right hand: this weakness progressed by very slow degrees. He noticed also that after performing hard work which required the use of the right arm, there resulted pain in the elbow, chiefly anteriorly, but also along the ulnar border of the forearm: this pain disappeared after the arm was rested. While the pain lasted there was difficulty in opposing the thumb and little finger: this difficulty also disappeared after the arm was rested. Both these sequels of hard work have continued to appear up to the present time. The forearm has never become swollen.

Six months ago, in November, 1915, the patient's attention was attracted for the first time to a slight wasting of the right hand in the interspace between the thenar and hypothenar eminences; this wasting gradually increased until now there is a marked depression in that region. Six or eight months later he noticed wasting on the dorsum of the hand between the remaining metacarpal bones (Fig. 132), and at about the same time there was inability to extend completely the proximal interphalangeal joint of the little finger, which remains in the position of semiflexion. A few weeks later he noticed the same situation in the ring-finger, but less marked. This loss of power in the ring and little fingers has increased slightly since then. Accompanying the wasting of the thumb-muscles there were occasional itching and tingling in the ring and little fingers, but no actual pain.

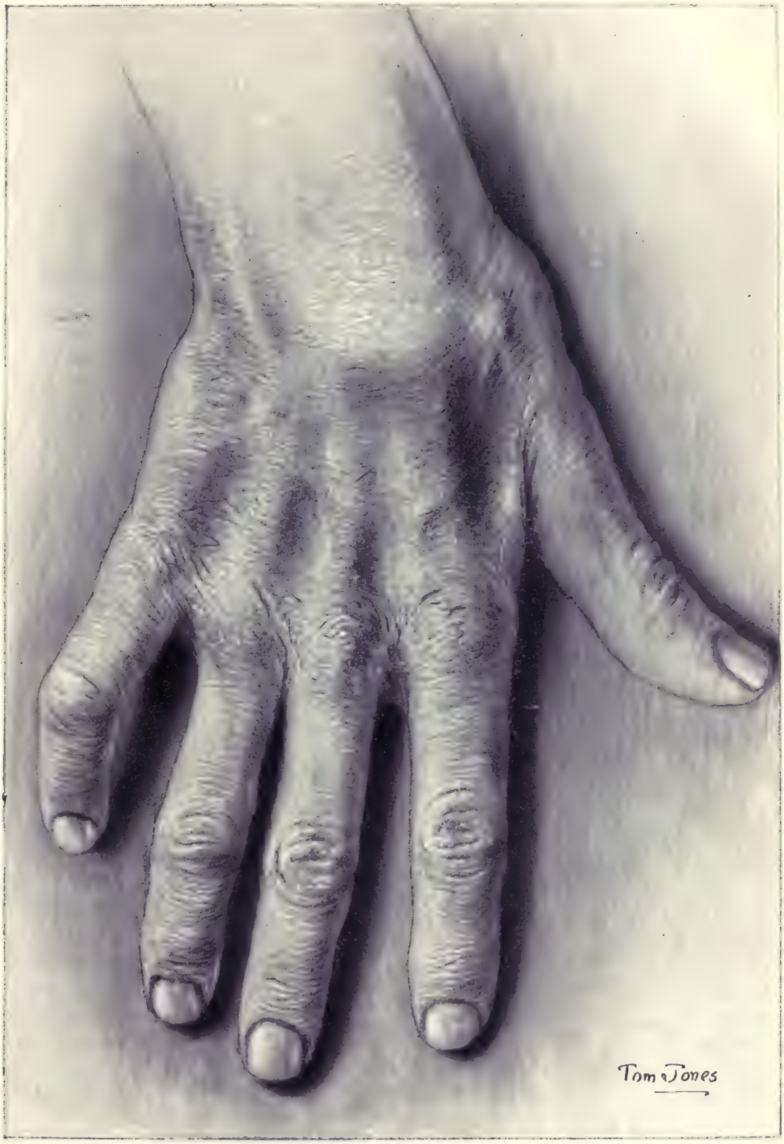

Fig. 132.—Shows atrophy of dorsal interossei muscles as part and parcel of ulnar paralysis. Note semiflexion of little finger.

During the past four or five months, on flexing the forearm quickly, the patient occasionally experienced a sensation "as though he had hit his funny bone," the sensation passing from the elbow downward along the ulnar border of the forearm: this

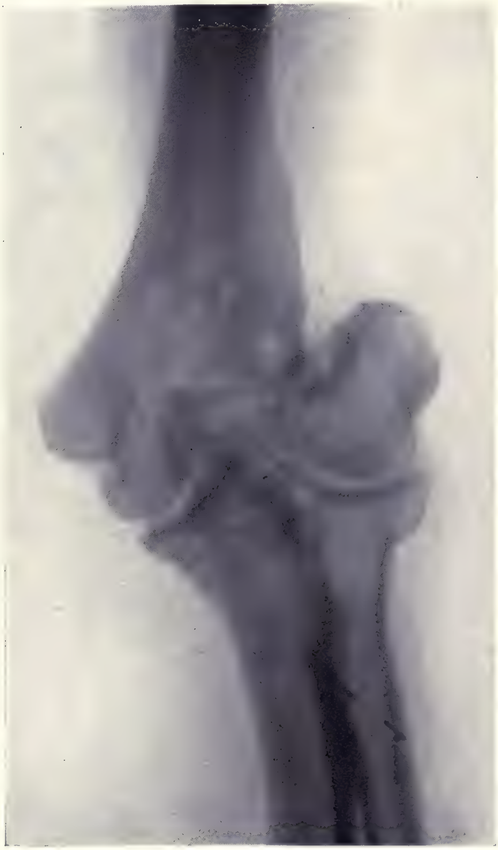

Fig. 133.—Shows fracture of external condyle with upward displacement of external condyle and increase of carrying angle of forearm. The result of this deformity is the bringing of the internal condyle into greater relief, stretching ulnar nerve in its fossa and subjecting it to recurrent traction on flexion and extension of forearm, with consequent development of hyperplastic neuritis of ulnar nerve, with associated pain and muscular atrophy, which are so characteristic of the disease. (Compare with Fig. 291, Vol. IV, December, 1915, p. 1107.)

same sensation arose when the arm was cold from exposure. For the same length of time, also, if the forearm is pressed against any object for a short time on the ulnar border, the latter and the hand begin to feel numb, as though asleep: this paresthesia disappears when the pressure is removed. During the same period he has occasionally noticed slight fibrillary contractions at the lower, inner portion of the hypothenar eminence.

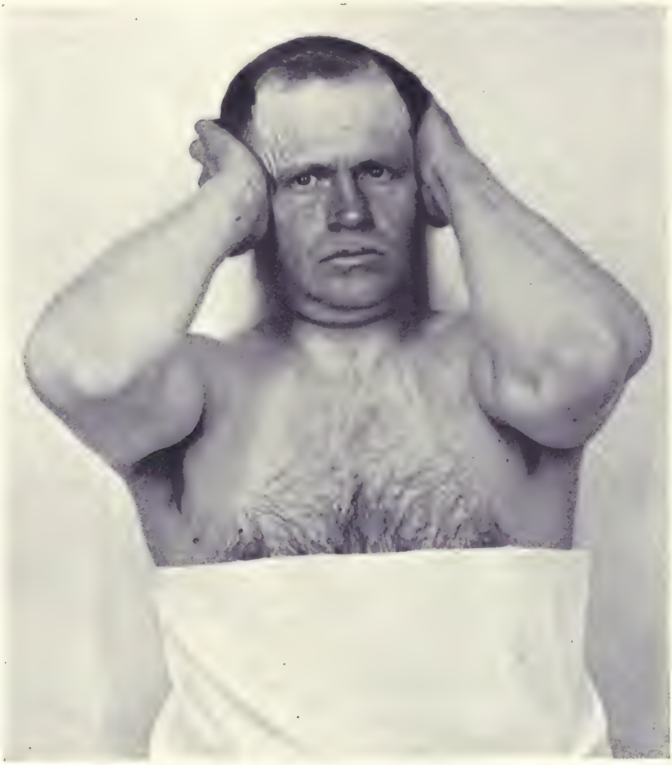

Fig. 134.—Shows contrast in appearance of elbows (note prominence of internal condyle), which is quite characteristic of fracture of external condyle with upward displacement. Compare with skiagram (Fig. 133).

Examination by Dr. Murphy (April 25, 1916).—The development of the muscles of the shoulder-girdle and arm is almost equal on both sides: those on the left are somewhat larger. The patient is unable to extend the right forearm as much as the left, but he can flex it very well. Skiagram (Fig. 133) reveals fracture of lower end of humerus with anterior displacement of both condyles: as the ulnar nerve bends around the deformity, it forms a very acute degree of angulation, thus accounting for the signs of nerve-disturbance in the forearm, and for the neuroma which is present on the ulnar nerve at the elbow. There is pronounced atrophy of the group of muscles supplied by the ulnar nerve. There is no cervical rib.

The internal condyle is very prominent and greatly thickened (Fig. 134). There are no gross sensory disturbances in the forearm or hand. Abduction and opposition of the little finger are absent, and flexion is quite weak: abduction and adduction of the index, middle, and ring fingers are practically absent.

COMMENTS

Dr. Murphy (April 27, 1916): What is the matter with the patient?

Intern: He has an interference with the function of the ulnar nerve.

What makes you think so?

Examination of the forearm shows that the muscles supplied by the ulnar nerve are weak and atrophied.

What muscles, for example?

Those of the hypothenar eminence, more conspicuously.

What are those muscles?

Superficially, the palmaris brevis; more deeply, the opponens, the abductor, and the flexor brevis minimi digiti.

What additional muscles in the hand are supplied by the ulnar nerve?

All muscles to the ulnar side of the tendon of the flexor pollicis longus, with the exception of the two outer lumbricals. The remaining muscles of the hand are supplied by the median nerve.

The paralysis of the muscles supplied by the ulnar nerve is as yet incomplete, for the long flexors of the fingers in its territory of distribution are uninvolved. The deformity of the elbow has existed twenty-seven years, for the fracture occurred when the patient was seven years of age. The external condyle was fractured and displaced forward, rendering the internal condyle prominent from the resulting cubitus valgus, and thus subjecting the ulnar nerve to tension over the internal edge of the olecranon. (See Mouchet's figure in Vol. IV, December, 1915, 1107.) Since he has now reached an age in which the muscles and other tissues are beginning to stiffen, the tension on the ulnar nerve is becoming greater. First, the trophic axons were affected by the trauma; next, the sensory; and finally, the motor. If the lesion should go on untreated, the paralysis, which is now incomplete, will become complete, and the neuroma will become larger: as it is now, you will find upon exposure that the nerve is nearly twice its normal diameter, from deposits within it of connective tissue the result of the recurrent traumata.

We have had quite a series of these cases—I think this is the seventh or eighth one. (See Vol. IV, December, 1915, 1095–1108—copiously illustrated.) They act all alike and are cured by the same means. A somewhat similar lesion is caused by the pressure of a seventh cervical rib upon the brachial plexus (Vol. V, April, 1916, 227–240), or, in the absence of cervical rib, from the pressure of an elongated tip of a transverse process of one of the cervical vertebræ—usually of the fifth, sixth, or seventh.

OPERATION

[Incision placed between olecranon process and internal epicondyle. On exposure, the ulnar nerve was found to be enlarged to practically double its normal size as it passed over the prominence of the condyle and olecranon: here it was as large as the sciatic nerve (Fig. 135), and was surrounded by deposits of fibrous connective tissue, which bound it down in its groove. The nerve was smaller above than below. The constricting band was dissevered, and the ulnar nerve was dissected free for one inch above the condyle and one inch below. The continuity of the nerve was verified by obtaining a positive response to the faradic current. The ulnar nerve, now freed, was shifted to a position in front of the internal epicondyle, where it was secured in a pocket of subcutaneous fat by a tacking suture of catgut (Vol. IV, December, 1915, Fig. 290, p. 1105). The wound was closed without drainage.]

POSTOPERATIVE COMMENTS

The "pulley" effect of the lower end of the humerus upon the ulnar nerve has now been done away with by transferring the nerve to a new bed, where, although it is more exposed to the danger of being contused, lacerated, or severed in an accident, yet it is not exposed to recurrent traumata as before. From the operation one may expect at least a checking of the degenerative process in the nerve, and possibly great improvement, with suspension of the annoying pain in the hand. The nerve having

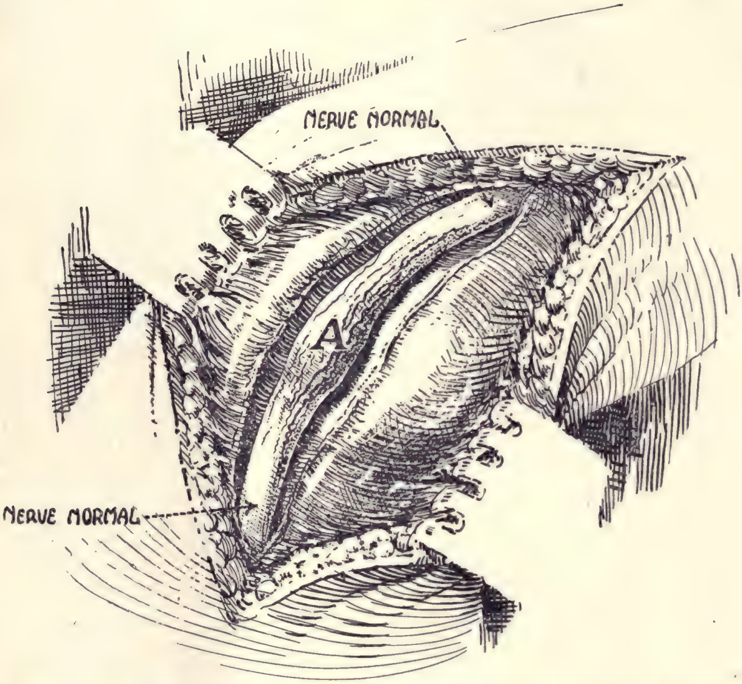

Fig. 135.—Exposure of ulnar nerve in its groove behind internal epicondyle. At "A" the nerve is expanded by a neuroma, whose surface is covered with dilated blood-vessels.

been removed from the source of irritation, the connective tissue which has formed within it will begin to be absorbed, and the power of transmission of impulses will be restored to the axons.

Overstretching of a nerve until the axons are ruptured is a much worse condition of affairs than actual division of the nerve: this condition is often found involving the brachial plexus from the patient's being swung by the arm around a shaft or pulley, and at operation months after such an accident there will be found nodules resembling a rosary over the whole nerve-trunk (Vol. IV, February, 1915, Fig. 15, p. 87).

Nerves unite very much like bone when their cut ends are approximated (*ibid.*, 91–2). The longest time a divided nerve has been known to regenerate when operated upon is twenty-six years after the accident which severed it; but of course, just as in the case of an ununited bone-fracture, the shorter the interval between the loss of continuity and its restoration by operation, the more rapid and satisfactory is the union.

As to the condition of the paralyzed muscles, while their fibers undergo a certain degree of atrophy, yet they are not destroyed, and recover themselves fairly rapidly after the power of transmission of impulses has been restored to the nerve-axons by operation; there seems to be no time limit in this direction either.

The faradic current is useful in determining whether or not the nerve is degenerated below the field of operation. In the case of suspension of transmission of impulses from nerve-compression, while no response is obtained when the faradic current is applied to the nerve proximal to the site of compression, yet when it is applied to the distal side the nerve responds, because it still contains living axons. The galvanic current, on the other hand, acts upon the muscle-fibers themselves, and produces a contraction even when the nerve is absent, and therefore quite independently of the nerve. But the faradic current never causes response in muscle unless the nerve is living, and for this reason the faradic current is the one that is used to test the condition of the nerve. All one has to remember is that when the nerve is degenerated no response is obtained with the faradic current.

but that when there is merely a suspension of transmission of impulses, an immediate response is obtained with the same current.

This case was very interesting, first, in its clinical course; secondly, in its interpretation; and thirdly, in the operative findings.

Postscript.—The wound healed *per primam.* The pain and discomfort disappeared immediately after the operation, and there was a pronounced return of sensation before the patient left the hospital.

ANCIENT UNUNITED FRACTURE OF RADIUS —IMPLANTATION OF BONE-GRAFT-SPLINT

Summary: Clinical history of patient; comments—importance of absolute immobilization after transplantation of bone; operation—fragments freshened and splinted by a transplant from tibia; postoperative note showing result.

CLINICAL HISTORY OF PATIENT

A FEMALE, forty-five years of age, school-teacher, was admitted to Mercy Hospital June 28, 1915.

The patient complains of an ununited fracture of the right forearm. On August 4, 1913, she was thrown from a buggy, landing on her right side, suffering fracture of four ribs with puncture of the lung, fracture of the clavicle, fracture of the radius (middle third), and laceration of the skin of the arm. On account of the patient's precarious condition very little attention was paid to the fracture of the radius, aside from fixing it with a lateral splint.

On September 20, 1913,—seven weeks after the accident,—open operation was performed upon the forearm, and the fractured ends of the radius were held in apposition by a strand of catgut.

On December 20th, owing to the presence of non-union, a Lane plate was applied to the fracture of the radius.

On December 30th the wound began to discharge pus.

On February 15, 1914, the plate was removed.

On June 27th a bone-graft-splint was inserted into the radius at the site of fracture: the operative wound healed *per primam*. A gypsum case was applied and retained four months: on removing the case it was found that union had not taken place.

Examination reveals no union: the bone-graft-splint has slipped out of place, and pseudarthrosis has developed.

COMMENTS

Dr. Murphy (June 30, 1915): One of the possible errors in this case was that the forearm was not sufficiently immobilized after the insertion of the bone-graft-splint: the latter is united at one end, while pseudarthrosis exists at the other. It is very difficult to immobilize the forearm firmly. In all bone-transplant work immobilization is the essential factor, for motion at the site of the transplant means the development of connective tissue, between the bone and graft, which blocks the passage of the Haversian vessels with their osteogenetic elements from the recipient bone into the graft, and which also forms a capsule over the bone-ends, resulting in pseudarthrosis. It remains to be seen whether or not I shall be able to utilize the bone-graft already in the fractured bone: if not, I must remove a fresh one from the tibia.

OPERATION

[Through an incision placed between the flexor and extensor groups of muscles the site of fracture of the radius was exposed. The periosteum was elevated from the bone above and below the fracture—one inch in each direction. So firm were the ligaments which had developed at the site of pseudarthrosis that a periosteotome did not suffice to detach them, but a strong, sharp scalpel had to be used. After removing the capsule the fragments were displaced and their ends were freshened with a saw: the medullary canals were then reamed out. A bone-graft-splint was obtained from the tibia, inserted into the freshened, flat surface of the radius, and retained in place with encircling phosphor-bronze wires (Fig. 136). Small bone-chips were arranged at the ends of the bone-graft-splint, to act as separate foci of osteogenesis (Fig. 137). After inserting a subcuticular stitch, the skin-edges came together without tension. A gypsum case was applied with the forearm straight out.]

POSTOPERATIVE COMMENTS

Failures of union in fractures of the middle or lower third of the radius or ulna are the most difficult in which to obtain union following a transplant, excepting aplasic conditions of the lower end of the tibia and fibula. The graft may be medullary, interosseous, or subperiosteal. You will note in the drawing as

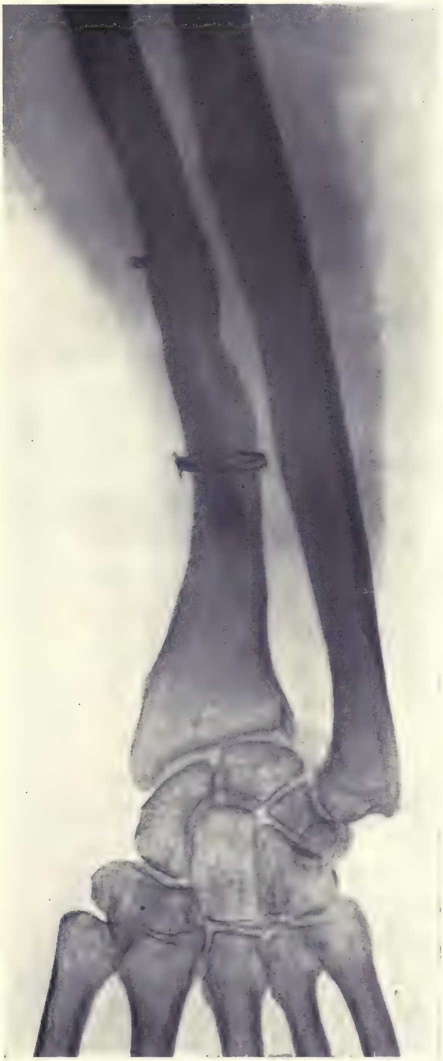

Fig. 136.—Postoperative skiagram showing bone-graft-splint *in situ*, encircled at ends by phosphor-bronze wire. Note bony union. (Taken December 21, 1915.)

well as in the text the stress which I lay upon the importance of elevating the periosteum above and below the line of fracture. This is the only essential principle and rule which I add to my original laws concerning bone-transplants. I feel that it is a very important factor. You will note also in this case that fragments of bone were placed between the bone-ends and around the graft to strengthen osteogenesis. This is another addition of moment and worthy of serious attention. The third factor accentuated by this case is the absolute immobilization for twelve or fifteen weeks following the transplanting. If a connective-tissue mass develops around the fragments at the line of approximation, then the osteoblastic elements on the blood-vessels will not be carried from the shaft to the graft. It is exactly the type of connective-tissue interposition that prevents nerve union as well as bone union after division or primary fracture. The forearm should be dressed in the supination position. The line of fracture in this case is exactly at the site of the nutrient foramen of the radius, which probably was a contributory factor in the non-union.

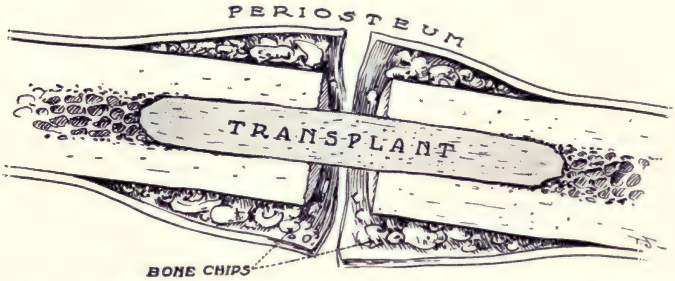

Fig. 137.—Diagram showing intramedullary method of inserting bone-transplant. Periosteum elevated from ends for an inch and bone chips inserted to act as energetic separate foci of osteogenesis.

Postscript (*December 21, 1915*).—There was primary union. A recent skiagram reveals bony union of the ends of the fragments and of the graft. A new gypsum case was applied.

ANCIENT LUXATION OF METACARPOPHALANGEAL JOINT—OPERATIVE REDUCTION

Summary: Clinical history of patient; comments—nature of the injury and its importance to wage-earners; operation—open reduction of luxation.

CLINICAL HISTORY OF PATIENT

A MALE, eighteen years of age, was admitted to Mercy Hospital April 26, 1916.

The patient complains of inability to flex the metacarpophalangeal joint of the little finger of the left hand; this injury was received on November 20, 1915, during a football game. The vulnerating force was applied to the tip of the finger, and forcibly hyperextended the latter at the metacarpophalangeal joint, the finger being displaced backward upon the dorsum of the metacarpal bone. Immediately severe pain manifested itself: the luxation was reduced, but recurred when the traction was lifted. The finger was dressed incompletely reduced: the patient could feel the prominent head of the metacarpal resting against the anterior splint. After the night of the accident there was no further pain. He resumed use of the finger at the end of three weeks.

Examination reveals luxation of the base of the proximal phalanx backward upon the head of its metacarpal bone, with corresponding volar prominence of the latter (Fig. 138).

COMMENTS

DR. MURPHY (April 27, 1916): In correcting the deformity of the finger the joint-capsule must be loosened until the phalanx can be restored to its proper relationship. The joint has been luxated so long that the head of the metacarpal bone has grown somewhat crooked. The luxation was complicated by a fracture which, however, cannot be corrected.

These cases are very difficult to handle. In a recent number of the Clinics we presented an account of a similar injury which occurred in the hand of a locomotive engineer, and the deformity of which totally incapacitated him because he could not grip the lever: so far as making a living was concerned, this seemingly trifling injury loomed up as large to that patient as though he had lost a limb. After a plastic resection of the head of the metacarpal bone, the patient resumed his work without further discomfort. (See Vol. V, April, 1916, 301–2.)

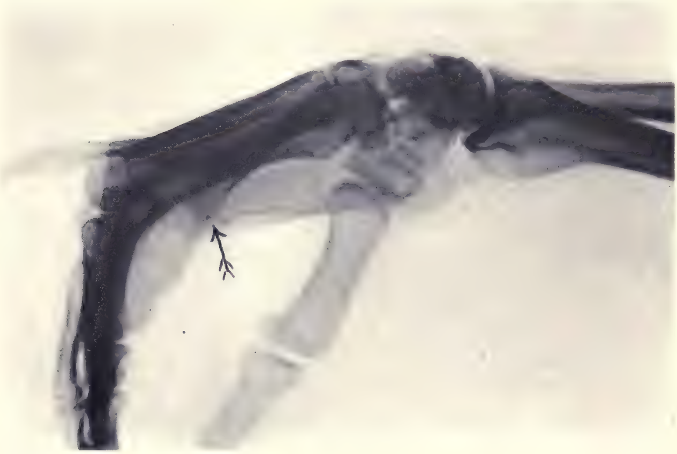

Fig. 138.—Dorsal luxation at metacarpophalangeal joint of little finger. Note base of proximal phalanx resting upon head of metacarpal, and volar projection of latter, as indicated by arrow.

The luxations of the terminal, second and first phalanges are not infrequently confounded with inability to extend. This is particularly true of the second and third, rarely of the first. This rectangular deformity of the tips of the fingers and thumb, the sequence of a blow on or sudden impingement of the tip of the extremity, is not due, as a rule, to luxation. It is due to a rupture of the extensor pollicis longus, or extensor pollicis brevis tendon of the thumb, or the extensor digitorum communis attachments in the fingers. It is not an uncommon accident to ball-players. It never recovers, except through operation, and the indication is for an immediate incision, exposure of the retracted and detached end of the extensor digitorum communis, and reattachment of the cut tendon to the third or second phalanx, depending upon which tendon is ruptured. Two cases of this class will be reported in the next issue of the CLINICS.

OPERATION

[Esmarch anemia was obtained with a Martin rubber bandage. The involved joint was exposed through an incision placed upon the ulnar border of the hand. On retraction of the wound-edges, it was found that a new joint-capsule had developed at the site where the banished phalanx rested upon the metacarpal bone. By dissevering the ligamentous bands the base of the phalanx was mobilized and restored to its normal position. One suture held it in place. An exostosis on the dorsum of the metacarpal bone was snipped off. The constrictor was removed. The finger was dressed in the position of acute flexion.]

Postscript.—The wound was dressed on May 6th—nine days after operation. Primary union was found to have taken place. The base of the phalanx still retains its normal relationship with the head of the metacarpal bone.

OCCULT CARCINOMA OF BREAST WITH METASTASES TO CERVICAL AND MEDIASTINAL LYMPH-NODES, GIVING PRESSURE SIGNS—NON-OPERATIVE TREATMENT

Summary: Clinical history of patient; examination—paralysis of left inferior laryngeal and phrenic nerves from metastatic lymph-node cancer; comments —operation not advised.

CLINICAL HISTORY OF PATIENT

A FEMALE, forty-seven years of age, consulted Dr. Murphy on February 2, 1916. The family and past histories are negative. Menstruation began at sixteen years of age, is irregular, occurs at from twenty-one- to twenty-six-day intervals, lasts from three to five days, and requires two or three napkins a day: there is no dysmenorrhea. For the past two years the patient has been flowing every eight or nine weeks. She has been married twenty-six years and has five children.

On September 20, 1915, the patient had a severe chill in the evening, which lasted one hour: she had no fever, but her pulse was weak. The next day she felt all right. Thereafter she began to feel tired out and run down, and gradually lost weight.

On November 1, 1915, the patient noticed hardness and enlargement of the left breast, with retraction of the nipple.

On November 12th the patient noticed a slight enlargement in the region of the left lobe of the thyroid gland.

On December 1, 1915, the patient became hoarse, and this hoarseness has continued to the present time. She now has a slight cough. After making a laryngoscopic examination, her physician stated that there was paralysis of the left vocal cord.

Examination by Dr. Murphy (February 2, 1916).—While there is respiratory excursion in the upper half of the left side of the thorax from action of the accessory muscles of respiration, yet the lower half is still, in keeping with the fluoroscopic findings that the left side of the diaphragm is immobile. There is a definite mass in the thyroid gland, which is as hard as wood: it does not seem to extend over into the region of the inferior laryngeal nerve, and one would infer that the nerve was probably caught lower down. There are enlarged lymph-nodes above the clavicle and behind it, extending down into the thorax. The left vocal cord is paralyzed. Both nipples are retracted: the cancer is situated deep in the mammary glands, and there is a large mass in the axilla. The enlarged nodes at the base of the neck evidently involve the phrenic nerve.

COMMENTS

The patient has probably had this cancer two and one-half years. My advice is that she should not be submitted to operation: she is going to die of the disease in any event, but will live longer if we do not operate, for the paralysis of the left side of the diaphragm enormously increases the hazard of operation, and she has hypostatic pneumonia even now.

The picture of wide-spread and advanced carcinoma is complete. There is a hard and firm but small neoplasm close to the trachea, just below the larynx, at the level of the isthmus of the thyroid gland: whether this neoplasm is of a fibrous type or metastatic carcinoma I do not know; but I judge that the primary focus was in the breast, whence metastases spread into the lymph-nodes at the root of the neck and into the mediastinum, involving the left inferior laryngeal and phrenic nerves.

The first time the patient consulted a physician was on September 27, 1915, when she got up in the middle of the night with a chill: for this she was given strychnin tablets. She consulted another physician on November 25, 1915: this time she had grippe with a dry cough, but did not complain about the breasts. Notwithstanding the other symptoms of which she complained, the first time she mentioned the trouble in her breasts to her physician was on January 27, 1916. She has had no signs referable to cranial mischief, but there has been a little pain in the left side of the neck.

So far as the symptomatology is concerned, this is a case of occult carcinomata in the breasts, but nipple-retraction is a well-marked sign. In our Clinic we have had a number of cases of occult cancer of the breast. The breast lesion had not been recognized by the patient and was discovered only after we had made a general examination to ascertain the site of the primary cancer which had metastasized mostly into the bone. In two of these cases the lesions in the bones appeared to be the sequence of trauma, but *x*-ray examination and analysis proved that they were metastases. Then the lesions were found in the breast, and from the magnitude of the breast lesion it evidently had been present for many months.

In a paper entitled "Branchiogenic Carcinoma," Warner (*Annals of Surgery*, July, 1916, 1–7) states in his summary: "Carcinomata may arise from embryonic epithelial inclusions of any of the gill-clefts. . . . When a cancer arises from the second cleft, it is situated just below the angle of the jaw and in front of, or just under, the sternomastoid muscle. . . . Tumors of the carotid body may develop which will require differentiation from gill-cleft carcinomata. In doing so, one should remember that the carotid body belongs to the chromaffin system. . . . Endotheliomata likewise require especial thoughtfulness in diagnosing, which can be done only when the morphologic cell structure is studied. . . . A common source of error preceding operation is to mistake these various neck conditions for enlarged lymph-nodes. . . . When a branchiogenic cyst has been in existence for some time, it is not unusual for a carcinoma to develop on the wall of the cyst. . . . Lymphangioma, sarcoma, cystic goiter, and *secondary carcinoma of the lymph-nodes*,* or other structures, are to be thought of in making a differential diagnosis."

In his conclusions Warner states:*

"1. The mortality of branchiogenic carcinoma is very high. This is probably quite as much due to the start it gets before operation, owing to its deep seat, rendering diagnosis so difficult, as to any extreme malignancy of the growth, although this is sometimes very great. . . .

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* Italics ours.

"4. *The only hope for making any satisfactory reduction in the mortality rate following operations for branchiogenic carcinomata is to operate earlier in their progress.*

"5. Any hard swelling in the region of the branchiogenic clefts should immediately arouse suspicion of branchiogenic carcinoma, *especially if associated with pain as a prominent symptom.*"

SARCOMA OF STERNUM—RESECTION

Summary: Clinical history of patient; comments—various tumors of sternum in order of frequency; retrospect of history; etiology of ulceration of bowel; effect of pregnancy in modifying syphilis in mother; operation—resection of involved portion of sternum; pathologic report.

CLINICAL HISTORY OF PATIENT

A FEMALE, sixty years of age, was admitted to Mercy Hospital May 4, 1916. The family history is negative. The patient has never suffered from typhoid fever. In 1908 she was treated for three or four months for an ulcer of the bowel. She has been married forty years, but was never pregnant.

The patient complains of a hard, tender swelling over the upper part of the sternum, to the right of the midline. On October 1, 1915, she fell downstairs,—four or five steps,—landing upon the front part of her body on the floor: she received no bruises, with the exception of a slight laceration of the skin over the knee. Since several weeks following this accident she has felt an occasional ache in the region of the sternum.

On April 13, 1916,—over six months after the fall downstairs,—the patient noticed a slight feeling of soreness over the upper part of the sternum: there was neither tenderness nor swelling; the patient rubbed the spot with liniment. The next day, on looking at the sore spot more closely, she noticed for the first time a slight prominence whose greatest diameter was one-half inch, and which, on palpation, was slightly tender and of bony hardness. She had no acute illness at the time, and no chills or fever.

Since the patient first noticed the tumor the latter has increased very slightly in size, but the tenderness has disappeared: the overlying skin is freely movable and has never been discolored. Occasionally there is a dull ache in the sternum at night, and at other times a throbbing discomfort in the upper thoracic region, in the midline.

For five or six days immediately preceding the appearance of the tumor, as well as for the last few weeks, the patient had been cleaning house, and in the course of her work had done considerable lifting, etc., but she can recall no definite trauma or strain.

The patient's general health is good: she has no cough and no difficulty in swallowing.

Examination by Dr. Murphy (May 3, 1916).—There is a swelling over the manubrium, which is situated a little more to the right of the midline than to the left of it. The bone on the margin of the tumor seems to be elevated. The tumor itself does not pulsate and yields no bruit: it was aspirated, but no fluid was withdrawn. There is no area of flatness in the chest. No enlarged lymph-nodes are palpable above the sternum. The Wassermann test was negative.

Examination of the urine is negative. The blood-pressure in the right arm is 180 mm.; in the left, 164 mm. *X*-ray shows no aneurysm, but shows some rarefaction of the manubrium.

COMMENTS

Dr. Murphy (May 5, 1916): What is the nature of this swelling? Tumors of the sternum are very rare: they comprise, in order of frequency, first, sarcoma; secondly, tuberculoma; thirdly, metastatic subperiosteal infections of the sternum and costal cartilages; fourthly, typhoid infections; and finally, the various metastatic infections which involve other bones as well as the sternum. Syphilis is included among these infections.

The history reveals, first, a trauma occurring in 1915; secondly,—beginning a number of months ago,—an indefinite type of discomfort in the neighborhood of the swelling—the patient does not know whether this discomfort was in the bronchi or in the sternum itself; thirdly, an ulcer of the bowel, in 1908. Of the lesions that produce ulceration of the bowel, the commonest is typhoid; the second in frequency is carcinoma; the third, syphilis, and the fourth, tuberculosis.

The history reveals no evidence of syphilis—neither a chancre of the vulva nor a rash. The patient has been married forty years, but was never pregnant. Had she been pregnant and had miscarriages or given birth to children, and received her syphilitic infection through her pregnancy, she would have shown neither rash nor sore throat; for when syphilitic infection results from spirochetes entering through either the urethra or the lining of the uterus, the adenopathies, skin eruptions, or mucous patches do not necessarily arise—in fact, the rule is that such patients do not have these manifestations. (See Vol. IV, August, 1915, 580.)

If this tumor of the sternum should be sarcomatous, it would already have been beyond hope of relief by surgical measures: I therefore hope that it is due to another cause. If it is sarcomatous, we shall institute treatment with *x*-rays (Coolidge tube), sodium cacodylate, and Coley's serum; while if it is tuberculous, tuberculin will be administered.

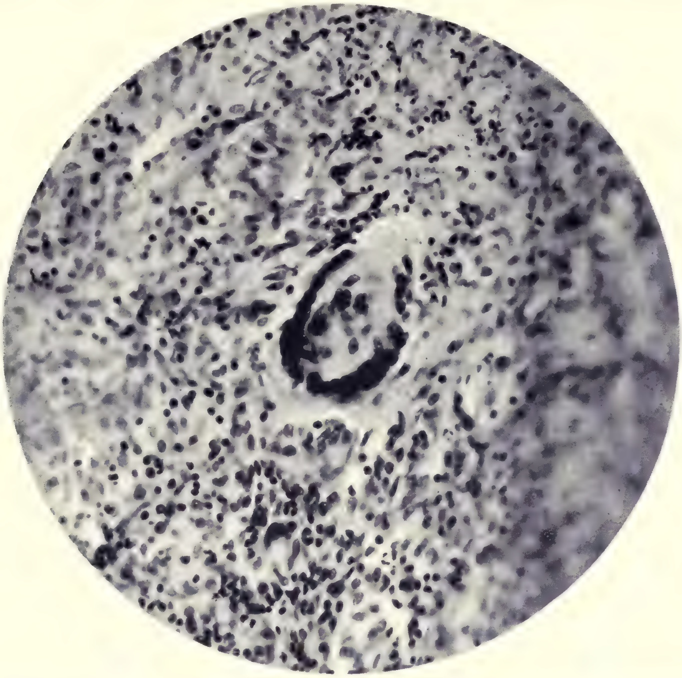

Fig. 139.—Sarcoma of sternum. A section from the body of the tumor showing a large giant-cell which is surrounded by spindle-cells and by small round cells. (× 250 diameters.)

OPERATION

[Through a vest-flap incision the tumor was exposed in the manubrium about one inch below the suprasternal notch: it was compact, superficially situated in the bone, and surrounded by an area of peculiar edema. When cut, it gave the impression of being a sarcoma. A disc of the involved area of bone about the size of an overcoat button was removed, and the raw surface left remaining was cauterized with the actual cautery. After closure of the wound the breasts were supported by adhesive strips, to obviate traction upon the sutures.]

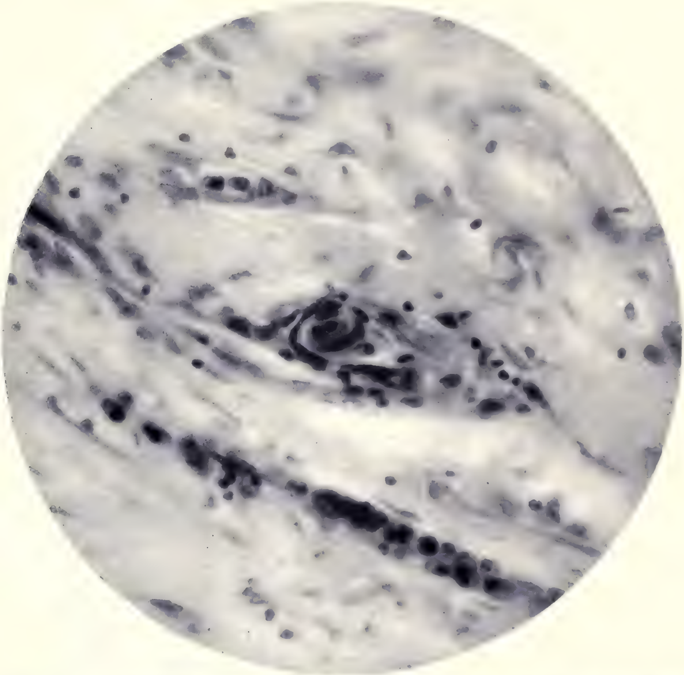

Fig. 140.—Sarcoma of sternum. This section is from the region of the tumor and shows the proliferation of cells in or near the capillaries. Small round cells, polymorphonuclear leukocytes, and fibroblasts are also found in this region. This section, therefore, contains the cardinal elements of granulation tissue, and substantiates the clinical observations made by Dr. Murphy during the operation. (× 250 diameters.)

Pathologic Report (*Dr. Baugher*).—The microscope reveals large giant-cell fibrosarcoma: one giant-cell was found containing at least 25 nuclei in one plane (Figs. 139, 140).

Postscript.—There was primary healing, with considerable edema and infiltration, the sequence of the cauterization.

A SERIES OF 16 ILLUSTRATIONS SHOWING CERTAIN PHASES OF GALL-BLADDER SURGERY (MODIFIED FROM KEHR)

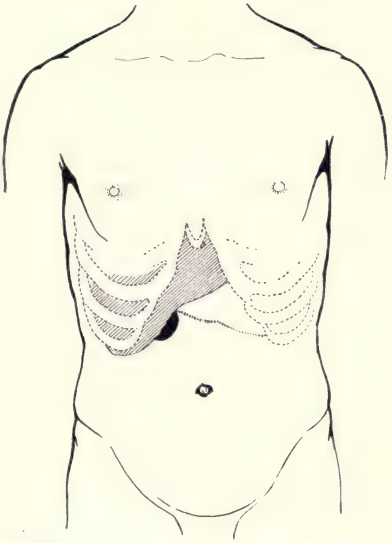

Fig. 141.—Normal position of gall-bladder when liver is not enlarged. Dotted line corresponds to greater curvature of stomach.

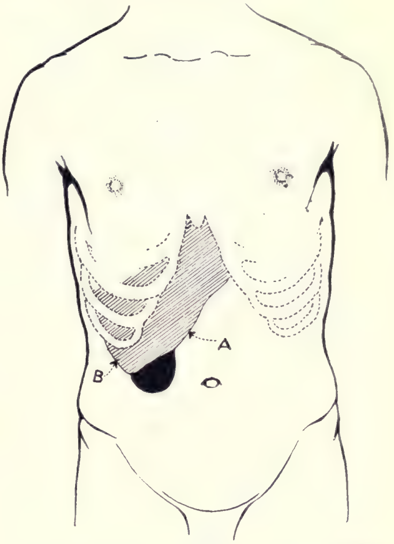

Fig. 142.—When the soft, pliable liver-edge can be felt at point *A* or *B*, it is pathognomonic of enlarged gall-bladder. This is one of the most positive signs in surgery; but in fleshy individuals it cannot, as a rule, be detected.

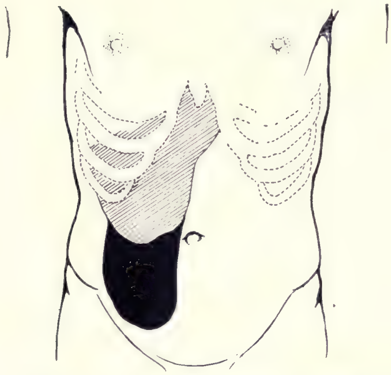

Fig. 143.—In this type of enlarged gall-bladder, which not infrequently accompanies obstruction of common duct from a tumor (carcinoma of pancreas, pancreatitis), care must be taken to distinguish overdistention of the gall-bladder from linguiform elongation of right lobe of liver (Riedel's process). In overdistention from such a cause jaundice is never lacking and is usually very intense. In the absence of jaundice such a great enlargement is to be regarded as hydrops with blockage of cystic duct by a stone.

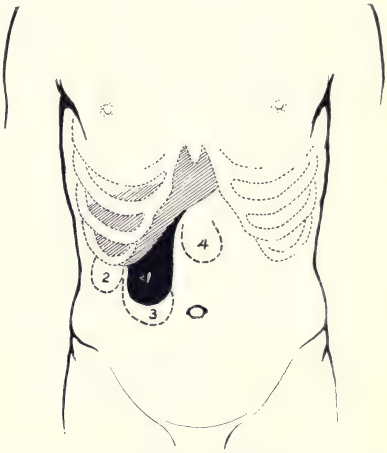

Fig. 144.—Some enlarged gall-bladders are very movable and can be readily displaced laterally (2) or to opposite side (4). On inspiration the gall-bladder descends to or below navel (3).

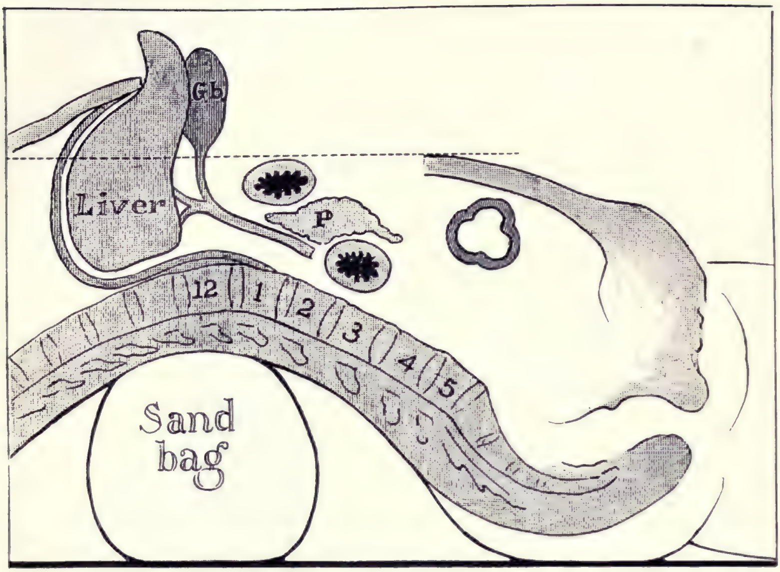

Fig. 145.—With the patient flat on his back on the table, the biliary tract is in the depths, almost beyond the surgeon's reach. With a sandbag beneath the thoracicolumbar region of the back, however, together with rolling of the liver around the costal margin, access to the biliary tract is greatly facilitated. (After Rio Branco.)

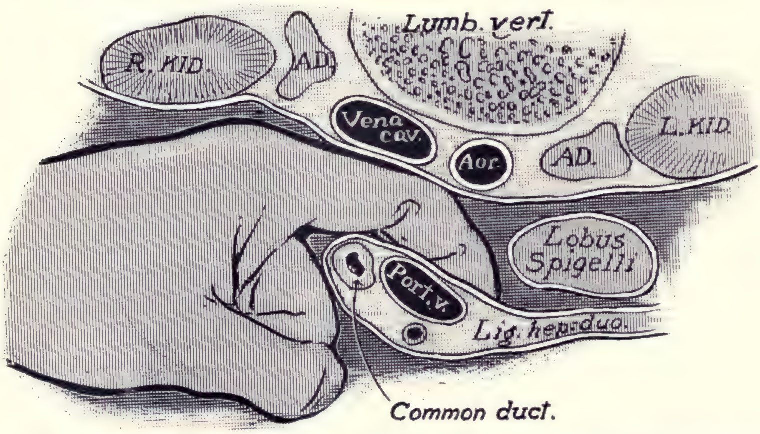

Fig. 146.—To find the foramen of Winslow, when it is not obliterated by adhesions, the index of the left hand starts at the fundus of the gall-bladder, passes to the neck, and takes the cystic duct as a guide to the foramen. Behind, from right to left, the finger glides over the right kidney, right suprarenal body, vena cava inferior, and abdominal aorta; on its palmar surface rests the hepatoduodenal ligament, or right free edge of the lesser omentum, which contains the bile-duct on the right, the hepatic artery on the left, and the portal vein behind and between these two vessels. The tip of the finger is in the lesser peritoneal cavity, and can be seen through the lesser omentum. Above the finger, but not shown in this plane, lies the caudate lobe of the liver; while below lie the first part of the duodenum and the hepatic artery (*pars horizontalis*). Normally, the various boundaries of the foramen lie in contact. (After Pantaloni.)

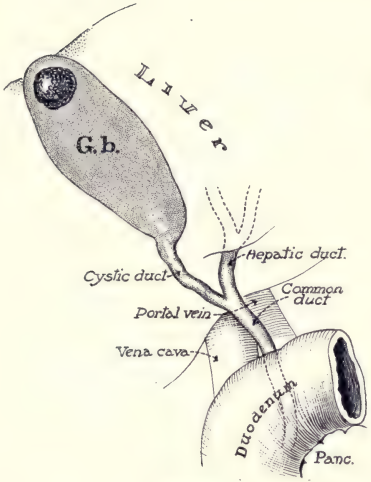

Fig. 147

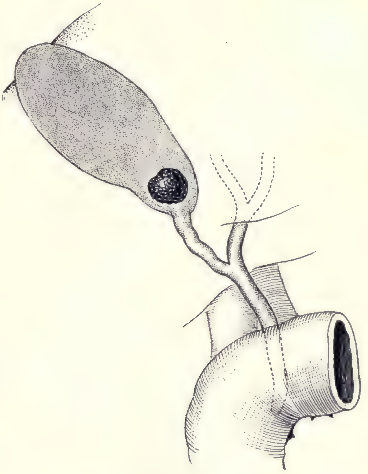

Fig. 148

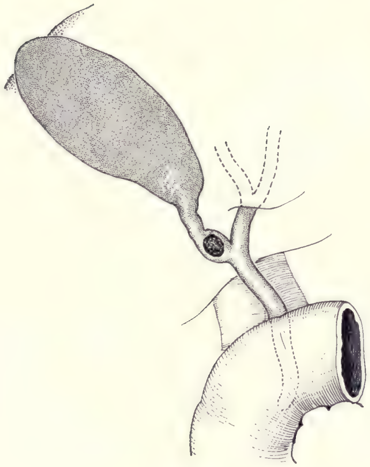

Fig. 149

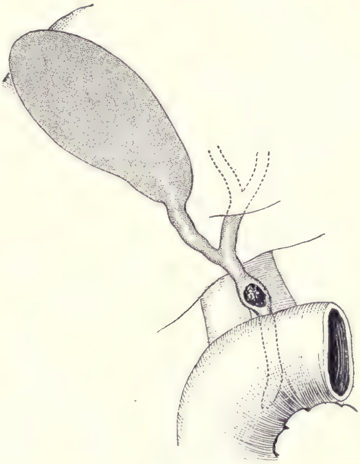

Fig. 150

Fig. 147.—Stone in fundus of gall-bladder. A stone in this situation can cause neither colic nor jaundice and is easily reached and removed. Cholecystolithotomy and cholecystostomy are usually indicated.

Fig. 148.—Stone in neck of gall-bladder. A stone in this situation can cause colic, but no jaundice. When impacted, the colic ceases, but the gall-bladder becomes distended with bile-stained mucus (*hydrops vesicæ felleæ*), or with pus (*empyema vesicæ felleæ*). In cases of long standing the gall-bladder may be snugly contracted down upon the stone. Cholecystectomy is usually indicated.

Fig. 149.—Stone in cystic duct close to its junction with hepatic duct. Colic and jaundice both can occur—the former when stone is in motion, the latter when stone is large enough to press upon hepatic duct and obliterate its lumen (compare Fig. 80, Vol. V, June, 1916, p. 400). Cholecystostomy or cholecystectomy, according to extent of pathology.

Fig. 150.—Stone in supraduodenal portion of common duct. Both colic and jaundice probable. Choledocholithotomy with drainage by *T*-tube commonly performed.

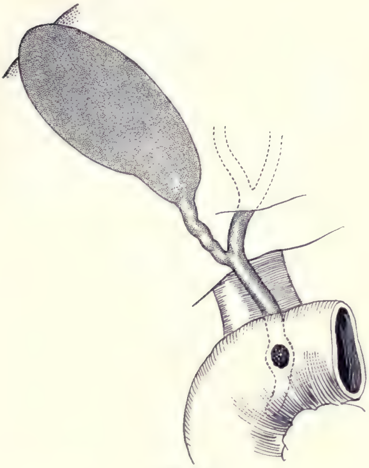

Fig. 151

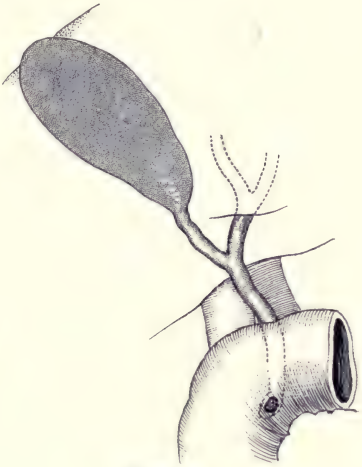

Fig. 152

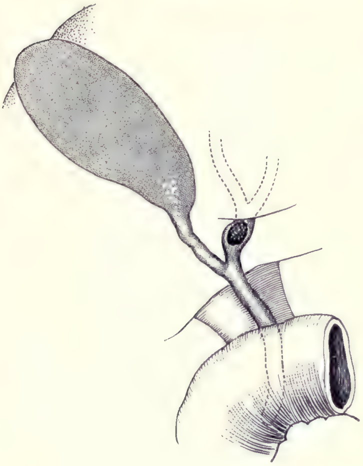

Fig. 153

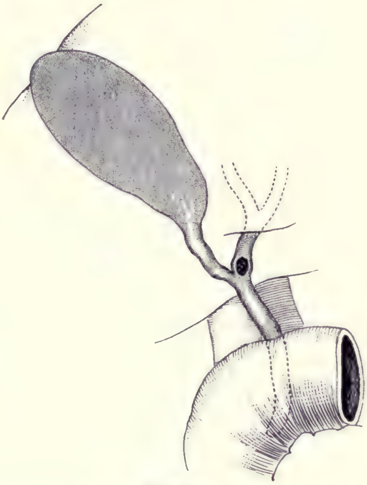

Fig. 154

Fig. 151.—Stone in retroduodenal portion of common duct. Colic and jaundice. Dislodge into supraduodenal portion and remove as in Fig. 150. If this is impossible, mobilize duodenum by Haasler's method and perform retroduodenal choledocholithotomy.

Fig. 152.—Stone in papillary portion of common duct (ampulla of Vater). Colic, jaundice, chemical (bile) pancreatitis. If cannot be dislodged upward or downward, perform transduodenal choledocholithotomy (McBurney) as in text-case. Transpancreatic choledochotomy is an alternate measure of occasional applicability and usefulness (Harrigan, in *Surg., Gynec. and Obst.*, July, 1916, 14–21).

Fig. 153.—Stone in common hepatic duct just beyond junction of right and left hepatic ducts. Both colic and jaundice probable. Reach through choledocholithotomy or hepaticolithotomy. *T*-tube drainage.

Fig. 154.—Stone in common hepatic duct close to its junction with cystic duct. If the stone is large enough, it may compress cystic duct (compare Fig. 149).

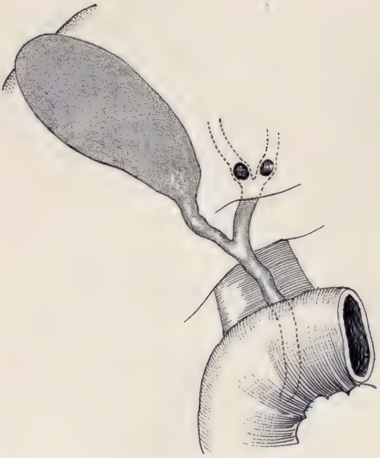

Fig. 155

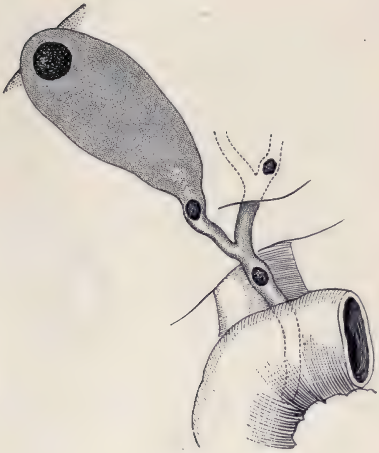

Fig. 156

Fig. 155.—Stones in right and left hepatic ducts. Probability of colic, jaundice, Charcot's intermittent fever. Reach and remove through choledocho- or hepaticolithotomy; if stones are in peripheral tributaries of hepatic ducts (compare Fig. 82, June, 1916, p. 426), hepatolithotomy may be necessary (see Fig. 81, *ibid.*, p. 425).

Fig. 156.—Ubiquitous stones. The possibility of multiple stones being present in a given case, and in different parts of the biliary tract, must be borne in mind in every gall-stone operation, and their presence or absence should always be determined before the completion of the operation.

BILIARY CALCULUS IMPACTED AT AMPULLA OF VATER; CONTRACTED GALL-BLADDER —TRANSDUODENAL CHOLEDOCHOTOMY; CHOLECYSTOTOMY

Summary: Clinical history of patient; comments—interpretation of case from clinical history; significance of slow coagulation time of blood; operation—stone impacted in ampulla: diminutive, contracted gall-bladder—transduodenal choledochotomy: cholecystotomy; postoperative comments—résumé of some points brought up during operation; correlation of clinical history with operative findings.

CLINICAL HISTORY OF PATIENT

A MALE, fifty-seven years of age, an insurance agent, was admitted to Mercy Hospital March 28, 1916. The family history is negative. In 1909 the patient was operated upon for right-sided inguinal hernia.

The patient complains of pain on the right side, just below the costal margin, and of jaundice, nausea, and vomiting. In 1913 he noticed for the first time slight discomfort in the region of the gall-bladder and distention of the stomach: relief was obtained by eructations of gas. He vomited on two or three occasions from one to two hours after meals: this vomitus was not bile-stained, and much relief was afforded by the act.

On January 15, 1916, the patient experienced a very severe pain in the gall-bladder region: this pain was an intense colic and remained localized; vomiting occurred twice, but without affording relief. There was neither fever nor chill. The pain disappeared on the following day.

On January 17th—two days after the intense colic with emesis —the patient became deeply jaundiced.

On February 1st the patient was removed to a hospital and submitted to operation: through a celiotomy wound the gall-bladder was inspected, but no stones were found; the head of the pancreas was inflamed; *the abdomen was closed without drainage* *of the biliary tract.* Three days after the operation the patient was attacked by pain of such great intensity as to require a hypodermic dose of morphin for relief: the next morning he was jaundiced. He remained in hospital three weeks.

Since leaving the hospital the patient has experienced seven or eight attacks of colic, and the jaundice has been continually present. He states that, but for the gaseous discomfort in the stomach, he was perfectly well up to the time of the first attack in January. During the past twelve weeks he has lost 30 pounds in weight.

Examination of the blood on March 29th—the day after admission—showed 20,400 white cells; 5,340,000 red cells; and 75 per cent. hemoglobin. Five days later—on April 3d—the white-cell count was 9800. The blood coagulated in six and one-half minutes. Examination of the urine was negative.

On the morning of the operation (at 6 o'clock) the temperature was 97.6° F.; pulse, 68; respiration, 20.

COMMENTS

Dr. Murphy (April 5, 1916): This is a very interesting case: our interpretation of it is that at the time of the operation gall-stones were present (a stone was probably impacted in the cystic duct), but were overlooked, and that these stones eventually worked their way down into the common duct. The latest attack of colic occurred so recently as last night. The coagulation-time is slow, thereby signalizing a certain amount of danger from hemorrhage.

OPERATION

[After making a celiotomy incision adhesions to the anterior abdominal wall were encountered and dissevered. The gall-bladder was searched for, and was found to be deeply embedded in the cicatricial tissue and no larger than the two distal segments of the little finger. If the original operator encountered the same degree of fixation of tissues that I encountered, I think that he was very wise in abandoning the operation without locating the gall-stones. It was opened and a spoon and a Moynihan sound were passed into it. On palpating the ducts a stone was felt impacted at the ampulla of Vater. The duodenum was mobilized by Haasler's method and drawn upward into the field until it was practically outside of the abdomen. It was distinctly a "grubbing" operation. The ampullary portion of the duodenum was blocked off by clamps placed proximally and distally. The anterior wall of the duodenum was incised, exposing the papilla of Vater and the orifice of the ampulla: the stone did not protrude through the latter. The ampulla was divided over the stone, and the latter, which was of small size, was removed. It was deemed unnecessary to suture the small incision made in the anterior wall of the ampulla. The incision in the anterior wall of the duodenum was closed by deep and superficial sutures: the deep ones (catgut) were of the Czerny type, and went through all coats as hemostatic stitches, while the superficial (Pagenstecher linen) were Lembert sutures arranged in two rows, so as to turn in the deep sutures completely. To afford additional security, a fold of omentum was tacked over the duodenal line of sutures. After removing the instruments from the gall-bladder a rubber tube was passed through it into the cystic duct, and secured in position by catgut sutures, which were inserted in such a manner as to make the drain mechanically a part of the gall-bladder. A larger drain was inserted into Morison's renal pouch. After accounting for instruments and sponges, the celiotomy incision was closed in the usual manner, making allowances for the agents of drainage.]

POSTOPERATIVE COMMENTS

There was not so much bleeding as we had anticipated, considering the slowness of the coagulation-time. The common duct was very greatly thickened, and the triad of jaundice, stone impacted in common duct (ampulla), and diminutive, contracted gall-bladder was a beautiful illustration of Courvoisier's law. In talking this matter over with the patient yesterday I said I felt that I would have to perform transduodenal choledochotomy, since all signs pointed toward the presence of a stone in the ampulla of Vater. Before discovering the stone at the ampulla I examined the first portion of the jejunum by palpation, to make sure that the stone had not escaped from the duct into the intestine and traveled downward: by reason of its small size the stone was somewhat elusive, but it was finally detected at the ampulla.

Now we shall correlate the history with the operative findings. Was the patient jaundiced at the time of the first operation? If he was, and if the jaundice followed an attack of colic, it is evident that a stone must have been present in the common duct at the time of that operation, unless it had just escaped into the bowel. Presumably the reason the operating surgeon did not determine that fact—nor anything else about the case—was the dense mass of adhesions, not to mention the diminutive size of the gall-bladder, which was hidden from view by the adhesions.

The evidence that a stone should be present in the common duct was made clear shortly after the first operation, when the patient had attacks quite similar to those preceding the operation—colic requiring morphin, followed by jaundice, which continued up to the time of his present admission. Between the time of the first operation and the present one the patient had numerous recurrent attacks of colic, of which the last occurred the night before operation: that is why I was so persistent in exploring the common duct clear down to its duodenal orifice.

I often thank my lucky stars that I did not encounter a case like this in the early days of my gall-bladder work, for it was surely a Gordian knot to untie.

CAUSE OF RECURRENCE OF SYMPTOMS FOLLOWING OPERATION FOR GALL-STONE DISEASE.—(*John B. Deaver—Unpublished paper.*)

Late operation.
Type of operation.
Adhesions—Futility of separating adhesions if the lesion can be corrected without.
Failure to have (1) *Corrected all the pathology;** (2) *established proper drainage.*
Internal biliary fistula.
External biliary fistula.
Contraction of the papilla of Vater.
Stricture of the common duct.
Stricture of the hepatic duct.
Stricture of the cystic duct.
Chronic pancreatitis; pancreatic lymphangitis and interstitial pancreatitis.
Adherent duodenum, pylorus, or stomach.
Acute cholangitis.
Chronic cholangitis.

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* Italics ours.

Postscript (*April 12, 1916*).—The patient made an uneventful recovery. The jaundice disappeared rapidly and he left the hospital in the usual time.

June 16, 1916.—The patient writes that he is feeling fine and has had no further trouble from the gall-stone disease. He now weighs 175 pounds—35 pounds more than at time of discharge from hospital.

(For the report of a somewhat similar case, together with bibliography of biliary calculus, consult Vol. IV, December, 1915, 1137–43.)

SUBPERITONEAL STREPTOCOCCIC CELLULITIS—TALK ON STREPTOCOCCIC INFECTIONS

Summary: Clinical history of patient; comments—cases illustrative of various types of streptococcic infection: (1) Subperitoneal cellulitis associated with (*a*) appendicitis; (*b*) pharyngitis; (*c*) parturition; (2) streptococcic cellulitis in an extremity; the fallacy of poulticing phlegmons.

CLINICAL HISTORY OF PATIENT

A FEMALE, twenty-seven years of age, was admitted to Mercy Hospital January 29, 1916. The family history reveals that the patient's father died from tuberculosis. The past surgical history shows that the patient submitted herself to operation in 1908, when the appendix and both tubes and the left ovary were removed. She was in Mercy Hospital in December, 1911, and at that time the diagnosis of tuberculous peritonitis was made: tuberculin treatment was instituted, and the patient left hospital in April, 1912, practically cured. On October 12, 1913, she was operated upon by Dr. Murphy for intestinal obstruction; and again in May, 1915, for gastroptosis.

On January 22, 1916, the patient suffered from what she termed acute grip: she experienced general malaise, with pain in her head, back, and abdomen, but had no chill, fever, cough, sore throat, or coryza. The next day she had chilly discomfort, but does not think that there was a definite chill.

On January 26th the patient was so sick that she took to bed. The cold continued until the twenty-eighth, when she felt much better and got up.

On January 28th the patient had cramps in the abdomen after supper: these cramps gradually increased in frequency and severity until 11 P. M., when they became unbearable. She felt hot and feverish. Gas was rumbling in the intestines the whole time. At 1 A. M. a physician visited her and found her temperature normal. At 3 A. M. she was given a hypodermic injection of morphin and an enema, whereupon a moderate amount of fecal matter came away. At 3.30 A. M. she was given another enema, which resulted in bringing away gas, but very little fecal matter. At 4 A. M. she vomited for the first time: she attributed the vomiting to some salt water which she had been drinking. While the morphin did not relieve the pain, yet she was quieter for about two hours. At about 9 A. M. she felt nauseated, but did not vomit.

The pains have been continually present since. There has been no passage of gas or of fecal matter since the last enema was administered. The patient has not belched very much gas, but has felt nauseated, especially during the periods of pain, which have been coming on more or less frequently since the twenty-eighth.

COMMENTS

DR. MURPHY (February 5, 1916): There is a type of peritonitis which arises from streptococcic infection *via* the appendix. I remember my first case very well: it occurred in the month of February, and the patient was a young woman. She had been to a dance on Saturday night, and after returning home from the dance had considerable pain in her lower abdomen. She was brought to hospital on Monday morning, and was assigned to the medical division. The leukocyte count upon admission was 30,000. A few hours later—at 1 P. M.—the leukocyte count was 76,000, showing the hidden drama that had been enacted since her admission in the morning, and she was transferred to the surgical division. The pain had been continual. She was extremely sensitive over the whole abdomen, and a diagnosis of acute appendicitis was made. At operation a typical streptococcic infection of the appendix and subperitoneal cellular tissue was found: the appendix was not perforated, but was merely puffed up from edema; the abdomen was drained in the usual way. There was a cloudy serum in the peritoneal cavity, but no pus. The meso-appendix was greatly infiltrated. The peritoneum itself was red and blistered and the subperitoneal zone was edematous and infiltrated. After the operation the patient was intensely sick, and for a few days it looked as though she would die, but she finally recovered.

Three years ago this winter there was a similar epidemic in which, after a primary attack of pharyngitis, pain appeared in the right lower quadrant of the abdomen, spread rapidly, and indicated peritonitis of streptococcic type, metastatic to the pharynx as the primary focus.* Many of these patients in this city were operated upon, the appendix was removed, and many of them died from the general bacteriemia, pneumonia, nephritis, etc. As soon as we recognized the sequence of sore throat followed by peritonitis, and the streptococcic nature of the infection, we no longer operated upon these cases, for they fared better without operation, since streptococci cannot be removed by drainage, but travel through lymph-spaces like water through a sieve: if at this critical time the resistance of the toxin-saturated patient should be further lowered by futile operative interference, a fatal termination is liable to follow instead of a cure.

This patient's infection is of the type just described: after a typical attack of influenza she had a sudden pain in the lower abdomen, which was more marked on the left side than on the right; her appendix and tubes had been removed previously, and she had had tuberculous peritonitis, from which she recovered. When she had this sudden acute attack we concluded from our examination that it was another case of streptococcic peritonitis. The leukocyte count was very high. We administered streptococcic serum, and now she is beginning to recover, although for quite a while her condition was very precarious.

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* In a paper entitled "Appendicitis as a Sequela of Tonsillitis," Anderson (*Am. J. Med. Sci.*, October, 1915, 541–8) concludes by emphasizing the following points:

"1. The importance of bearing in mind the liability of appendicitis to follow acute tonsillitis.

"2. That the appendicular involvement may be only part of a generalized infection, hence the gravity of such cases out of proportion to the local symptoms.

"3. The tendency for such cases to be atypical in their clinical course, and after smouldering, suddenly to develop fulminating symptoms.

"4. Chronic tonsillar infections should be kept in view as the possible cause of similar infections of the appendix.

"5. That whereas at least some degree of local tenderness and rigidity are almost always to be elicited on careful examination of the abdomen in the right iliac region in acute appendicitis, in rare cases these signs may be absent."

This type of peritonitis is not unlike the postpartum type we formerly encountered, which was also streptococcic in nature. The text-books of thirty-five years ago spoke of "dry peritonitis" which occurred after parturition. Upon opening the abdomen the surgeon, and more commonly the pathologist, of that day found a "blistered" peritoneum and a small quantity of free fluid in the peritoneal cavity, or none at all, so that he called the condition "dry peritonitis."

I recall the expression regularly used by Fenger when he encountered these cases in the course of his necropsy work as pathologist to the Cook County Hospital: "This is another case of that dry peritonitis." Fenger, however, failed to investigate the condition fully, not looking beyond the peritoneum.

During the operating *furore* of the next few years these "dry peritonitis" cases were operated by the pan-operation, with usually fatal results. The operation in vogue at that time was "panhysterectomy," or extirpation of the uterus and adnexæ; but, owing to the direful results, the operation was soon discarded. Further investigations showed that the lesion was not in the peritoneum, but involved the subperitoneal cellular tissue, and that it was streptococcic in origin, producing, true to type, cellulitis of the subperitoneal tissue, and redness and edema of the peritoneum, with scanty exudate into the peritoneal cavity itself.

This condition, then, was not "dry peritonitis," but subperitoneal cellulitis of streptococcic type—quite similar to the ordinary streptococcic cellulitis which occurs in the extremities. From the infected uterus the streptococci invaded the cellular tissue between the layers of the broad ligaments, and thence the subperitoneal tissues proper: it therefore stood to reason that extirpation of the uterus and adnexæ had no effect upon checking the infection, which was spreading like wildfire through the subperitoneal lymph-spaces. When this condition is recognized, the results are much better without operation, for the reasons stated above. In nearly all these cases there is the history of at least one severe chill, which appears usually within forty-eight hours after confinement—the same type of chill as this patient had.

Let me describe a classic case of streptococcic cellulitis of the upper extremity. My former associate, Dr. Neff, once had a patient who infected his finger while striking a match upon the seat of his trousers one morning: in the afternoon of the same day he had a chill and fever of 103° F., and the next morning the temperature was 104° F. There was very slight swelling in the finger at the site of infection, but a typical phlegmon appeared in the axilla and spread upon the chest. Through an incision in the axilla Dr. Neff released some of the edematous fluid and inserted drainage. Bacteriologic examination of the fluid revealed streptococci and colon bacilli, and the same microörganisms were recovered from the fluid with which all the joints were distended the next day. Blood-culture yielded a pure growth of streptococci. The patient eventually recovered.

Why streptococci travel so rapidly through the lymph-spaces is problematic: we can only accept the clinical fact that they do. If, in streptococcic cellulitis, the products of infection are given an early outlet, the chance of recovery is good, provided the patient's economy is not surfeited with an overwhelming dose of bacteria.

Streptococcic infections are self-limiting. At first this statement seems surprising, but it is a well-recognized fact. In the days when I was a medical student and when cadavers were not sterilized as at present, if a member of the dissecting class caught his finger on a hook, he would be liable to awaken during the night to find a phlegmon in his finger. If, then, he aroused his colleague and had him open the finger, he had a good chance of getting well; but if he got up the next morning yawning, with pain and sensitiveness in his axilla, the outlook was grave, for the toxins had already entered his circulation.

One day the late Dr. Moses Gunn pricked his finger while resecting a rib in a case of empyema. There was practically no pain that night, but the next morning he had an enormous swelling in the axilla. On the second day Dr. J. Adams Allen was called in. One of the consultants suggested that the great swelling be poulticed, but Dr. Allen said: "No! if you poultice it, you will kill him!" While Dr. Allen knew nothing about bacteriology in those days, yet he had learned from clinical experience that the larger the local swelling and the serous and cellular coffer-damming of the tissues, the greater the local resistance against entrance of toxins into the circulation. This anecdote shows what keen observers those older clinicians were. We now know that the swelling of the phlegmon is a manifestation of resistance of tissues to invasion of microörganisms: instead of being counteracted by poultices, etc., it should be regarded as an aid to resistance, just as Bier's passive hyperemia is an aid by bringing antitrophic serum and leukocytes to the defense of the economy.

Postscript.—The patient made an uneventful recovery, and was ready to leave hospital on February 27th.

In a paper entitled "An Epidemic of Appendicitis and Parotitis Probably Due to Streptococci Contained in Dairy Products," Rosenow and Dunlap (*Jour. of Infectious Dis.*, April, 1916) conclude: "It would appear, then, that these epidemics of appendicitis and parotitis were due to streptococci contained in dairy products. This fact and the fact that milk is such as excellent culture-medium make efficient pasteurization . . . imperative. . . .

"The importance of the streptococci contained in the dairy products as a possible source of infection for man is further shown by the fact that 6 per cent. of the animals injected showed ulcer of the stomach, 6 per cent. cholecystitis, 28 per cent. arthritis, 6 per cent. endocarditis, 20 per cent. myocarditis, and 26 per cent. myositis. The high incidence of myositis and myocarditis, which occurred 2 and 5 times as often as they occur with streptococci from the tonsils, is of special interest and in accord with the findings of Rosenow and Moon, who showed that streptococci from milk during an epidemic of sore throat had a marked affinity for the muscles in animals."

NON-FUSION OF UTERINE SEGMENTS OF MÜLLERIAN DUCTS—HYSTEROPEXY OF APLASIC, UNFUSED UTERINE STRANDS

Summary: Clinical history of patient; comments—brief review of case; embryologic development of tubes, uterus, and vagina; formation of an artificial vagina; operation—description of internal genitalia; hysteropexy of unfused uterine strands; postoperative comments—functional prospect of the patient.

CLINICAL HISTORY OF PATIENT

The patient, twenty-three years of age, was admitted to Mercy Hospital May 18, 1915. The family and the past histories are negative.

The patient states that she has never menstruated, but that since she was sixteen years of age, whenever it seemed to be the time for a regular menstrual period, she has had backache and an oppressive bearing-down discomfort and pains in both sides: these symptoms come on every twenty-six days and last four days. There is no show from the vagina. Aside from these symptoms she feels quite well.

Examination shows, on inspection, an imperforate hymen. There is no indentation where the opening for the hymen should exist, but there are two lateral indentations, as shown by the drawing. The probe, however, does not pass into either, and there is no evidence of an accumulation or a pocket behind and between these two indentations. Recto-abdominal palpation reveals the absence of the uterus and the presence of a little strand on the right side, and above this the ovary.*

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* Note how closely the history and findings up to this point correspond with those in the case reported by Milne (*Brit. Med. Jour.*, January 1, 1916, 15): "A girl, aged eighteen, was brought to me by her mother because she had never menstruated. She is a perfectly healthy, strong, and well-developed girl. I found an imperforate hymen. Examination under chloroform at the hospital revealed a strong, thickened hymen, but the uterus was completely absent, *although a thin whipcord extended from side to side of the pelvis.*"

COMMENTS

Dr. Murphy (May 19, 1915): This is a most interesting case. What is the matter with her? She does not menstruate, nor has she ever menstruated. About every twenty-six days she has manifestations as though she were going to menstruate: she has at these "periods" bearing-down discomfort, backache, and pains in the sides of the abdomen. That is the whole story of the case.

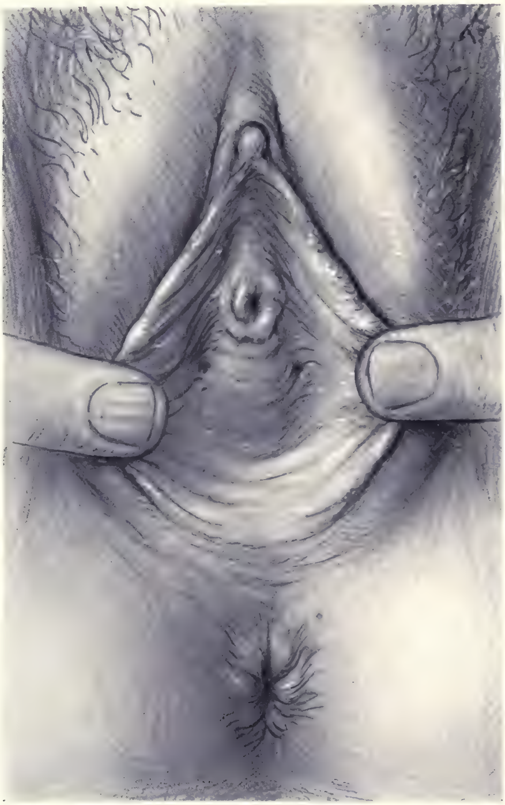

Fig. 157.—External genitalia showing absence of vaginal opening. Note lateral pits wide of and beneath external orifice of urethra. Note bulging of hymen.

The patient seeks advice because she is about to be married, and she wants to know what is wrong with her. The external genitalia are normal in every respect as far as the hymen (Fig.

157). The vagina is imperforate: there is nothing that one can see or feel to indicate that a vagina is there. The urethra is displaced a little farther back than normal. When inspecting the vulva without an anesthetic, we looked for an opening—such as is occasionally present—which would admit a probe and conduct it to the malformed uterus, but could find none. There is no enlargement of the clitoris, nor any undue development of the labia majora, such as would indicate that there had been an effort at the production of a scrotum. At each external inguinal ring—when the patient coughs—there is the protrusion of a mass which resembles an embryologic testis. There is absolutely no discharge of blood through the urethra. On bimanual recto-abdominal palpation I am unable to feel a uterus of normal contour, but there is a cylindric structure on each side of the pelvis which suggests failure of the Müllerian ducts to fuse and form the uterus.

The question arises as to what deviations from the normal embryologic development have occurred in this patient. The accompanying cut (Fig. 158) explains the situation very well. Situated externally to the Wolffian bodies there are seen two ducts which extend to the urogenital sinus: these are the Müllerian ducts, from which is derived the entire genital tract to the vaginal introitus. Graves ("Gynecology," 1916, 377) describes the fate of these ducts as follows:

"The Müllerian ducts are at first solid, and extend to the urogenital sinus as separate, unfused structures. Malformations of the genital tract always imply some disturbance in the proper development of these two ducts, and involve either an atresia of one or both ducts or a lack of fusion. If the development of Müller's ducts proceeds normally, they run close together in their lower half, eventually becoming merged into one structure. The upper parts of this structure (the future uterus) first acquire lumina lined with a single layer of cylindric epithelium, while the lower section of the fused portion (the future vagina) remains solid for a somewhat longer period, being composed of large cells rich in protoplasm. Gradually, however, this lower part also acquires a lumen and becomes the vagina. The fusion of the lower half of Müller's ducts is completed in the ninth fetal week. At this period the vagina is merged into a single structure, *but is still solid.* The uterus, on the other hand, is *separated into two hollow compartments,* this double construction remaining until the fourth or fifth month, when the uterus and vagina acquire a single communicating lumen, which shows no signs of the former double formation, except a slight depression at the fundus where the partition ended.

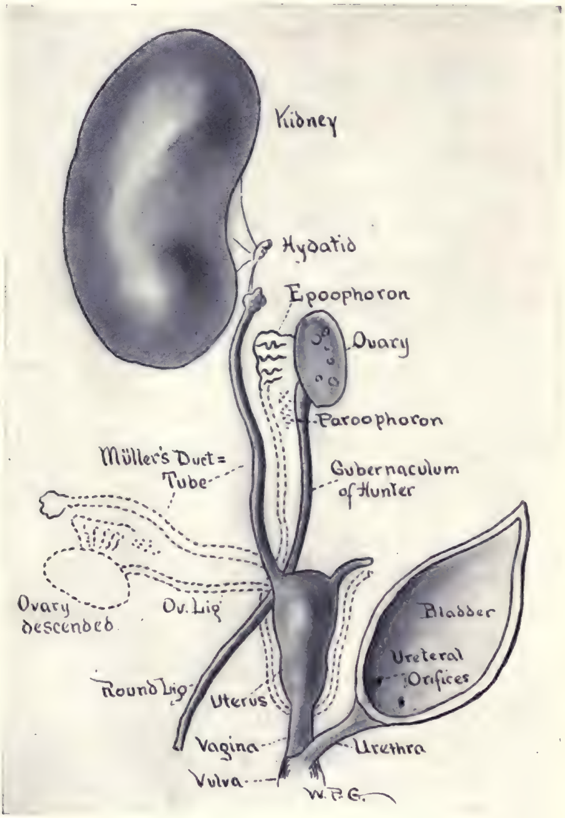

Fig. 158.—Diagram showing descent of ovaries and fusion of Müller's ducts into uterus and vagina. The way in which the gubernaculum of Hunter becomes the round and ovarian ligaments is shown. (Graves, "Gynecology.")

"At about the beginning of the fifth month the uterus becomes differentiated from the vagina by the formation of the vaginal portion (cervix). At the end of the fifth month the fundus of the uterus rounds out, so that all appearance of the former double character of the uterine body disappears. The wall of the uterus acquires muscle-fibers at about the fifth month, at which time also the hymen appears as a special differentiation of the lower vaginal segment. At birth the uterine body is small, thin walled, and insignificant in comparison with the cervix."

We have encountered these malformations of the genital tract in almost all phases of arrested or defective development, ranging from non-descent of the ovaries to almost completely developed male and female genital organs in the same individual. I recall one case in which the glans and other external organs were fairly well developed, and in which there was a well-formed uterus three-fifths of the normal size, with tubes leading from it: each tube consisted of a mass of muscular and other tissue without a mucosa-lining, and to each tube was attached a testis, one of which was undergoing sarcomatous degeneration—doubtless because it was aplasic.

You can see what an appalling calamity this vagary of development is for this patient, who is on the threshold of marriage. Had there been aplasia of the vagina alone, we could have provided an artificial vagina leading down to the cervix uteri by infolding flaps taken from the thigh: this method gives good results if care be exercised in its execution, but here there is no uterus, nor anything else to which the artificial vagina could be attached.

COMMENTS

[The pelvic viscera were exposed through a celiotomy incision, revealing the condition shown in the accompanying cut (Fig. 159). The ovaries and tubes occupied their usual positions, the former being normal, though somewhat cystic, and the latter, aplasic. Beyond the tubes two cord-like strands of fibrous tissue descended deeply into the pelvis and made an effort to form a vagina, but terminated in a white, fibrous strand which was about as large in circumference as a lead-pencil. The intervening portion—the unfused uterus—was attached on each side to a round ligament. by which it was drawn toward the external inguinal ring, producing the protrusion which was found upon physical examination when the patient coughed. The adjacent surfaces of the unfused uterine strands were scarified and stitched together in the midline, so as to prevent their protruding further through the external inguinal rings. So far as could be determined by palpation there was no mucosa-lining in these strands. The sponges and instruments were accounted for, and the celiotomy incision was closed in the usual manner, and without drainage.]

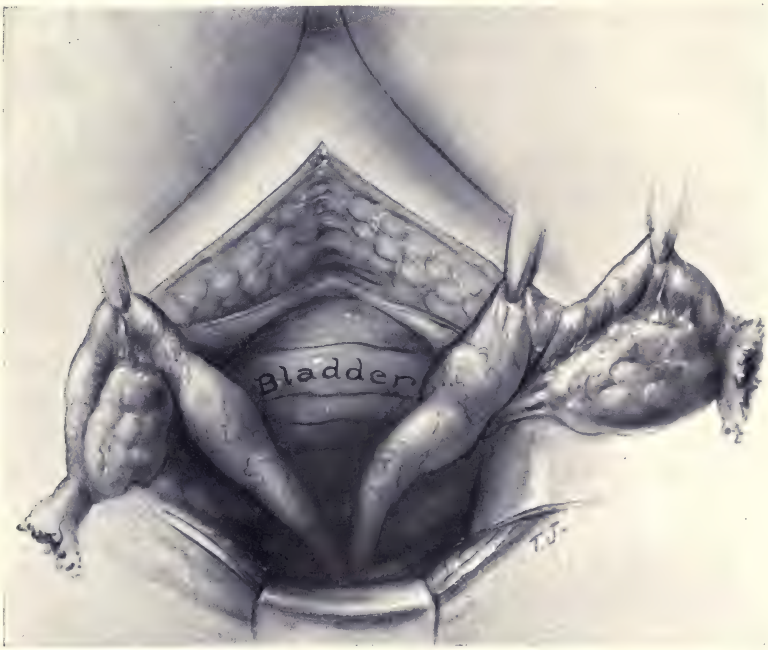

Fig. 159.—Internal genitalia showing non-fusion of halves of uterus. This is a persistence of the embryologic phase preceding fusion of the lower portions of the Müllerian ducts to form uterus and vagina.

POSTOPERATIVE COMMENTS

Ovulation should occur in the regular way, and the internal secretion of the ovary should be practically normal. There is not the remotest possibility of impregnation occurring. The breasts should develop to their normal size. Rectal examination in this case in the future will convey the impression of something in the midline resembling a uterus.

URETERAL CALCULUS—LUMBAR PYELOLITHOTOMY

Summary: Clinical history of patient; comments—estimation of renal efficiency; consideration of diagnosis; justification of exploratory operation; operation—lumbar pyelolithotomy; postoperative comments—status of *x*-rays in detecting stone; advantage of pyelotomy over nephrotomy; causes of renal hemorrhage in order of frequency; causes and treatment of "essential" renal hemorrhage; list of unnecessary abdominal operations performed through failure to detect stone; note on additional case of ureteral calculus.

CLINICAL HISTORY OF PATIENT

A FEMALE, forty-nine years of age, was admitted to Mercy Hospital December 12, 1915. The family history reveals no tuberculosis, but two sisters and an aunt suffered from cancer. In February, 1913, the uterus and adnexæ were removed: no microscopic examination of the specimen was made.

The patient complains of blood in the urine. On or about November 28, 1915, she noticed that the urine was dark: she was not jaundiced, but looked somewhat sallow; urinalysis showed the presence of bile. There was no fever, pain, or increase in frequency or amount of urination. The urine retained its dark and smoky character until December 20th, when the patient passed bright-red blood. On or about December 28th frequency of urination began to be increased, the patient arising four or five times a night: she had been urinating two or three times a night for the past ten years. She has no pain.

On January 4, 1916, cystoscopic examination revealed smoky urine in the bladder, and blood coming from the left ureter. The left kidney is secreting but one-third of the quantity of the right. An *x*-ray catheter was inserted into the left ureter and a plain catheter into the right. Skiagram was negative. The efficiency test proved to be 49.

COMMENTS

Dr. Murphy (January 8, 1916): The patient has practically the full renal efficiency: 50 represents the normal, and she has about 40 and 9, making 49; 75 per cent. of the urinary output is coming from the normal side; and for these reasons we feel at liberty to institute operative measures, especially since there must be some serious lesion of the left kidney, so greatly diminished is its output. There was no blood coming from the right ureter. What is the diagnosis?

The patient is stout and well nourished, so that palpation of the kidneys is most difficult. She has had urinary irritation for a long time, and has passed blood in the urine at intervals for a long time: the latter is the more alarming symptom. Skiagram is suspicious, but not positive; if anything, it would reveal a calculus of the hard type, such as an oxalic or uric-acid calculus, rather than a phosphatic, owing to the great quantity of fat.

An exploratory operation is strongly indicated, for if the patient is developing hypernephroma or sarcoma,—the commonest tumors of the kidney,—the time to remove it is while it is still small, and we shall remove the kidney if it shows any other gross changes that can be remedied by nephrectomy alone.

OPERATION

[Through a lumbar incision, observing the usual precautions of avoiding injury to the pleura, peritoneum, or iliohypogastric nerve, the kidney was exposed and delivered through the wound. It was found to be enlarged, and the tissues at the hilus were firmly adherent. A hard stone was palpated in the pelvis of the ureter and removed through an incision in the pelvis (Fig. 160). The incision in the pelvis was closed by a single over-and-over iodin catgut stitch, and a small strand of nosophen gauze was passed down to the stitched surface of the pelvis. After accounting for instruments and sponges, the wound was closed by deep figure-of-eight sutures for the muscles to prevent hernia, and then the skin-edges were apposed.]

POSTOPERATIVE COMMENTS

In closing the incision in the loin, care must be exercised not to include the ilio-inguinal and iliohypogastric nerves, as that causes great pain immediately after the operation and occasionally gives a permanent area of anesthesia which is disagreeable.

This case illustrates beautifully the importance of performing exploration of the kidney when one is unable to establish a clinical diagnosis. Notwithstanding the large size of the stone, it was not positively revealed by the x-rays; but that is not surprising, when one takes into account the statistics of one of the large hospitals in London, which showed that in 8 per cent. of the cases in which stone was present according to the skiagram,

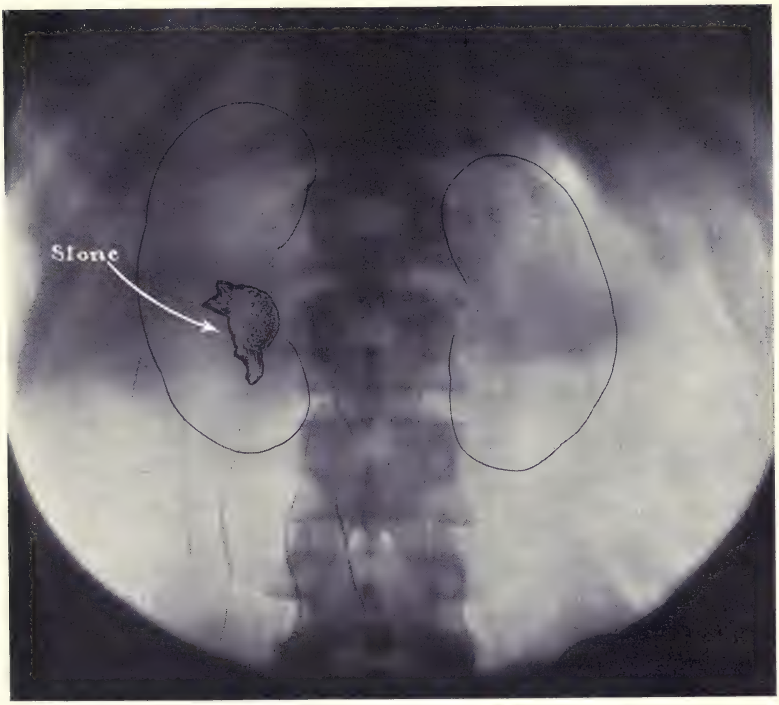

Fig. 160.—Stone in pelvis of ureter, outlined in negative skiagram as found at operation.

no stone was found at operation, while in 6 per cent. of the cases in which stone was absent according to the skiagram, a stone was found at operation, so that the *x*-rays err both ways. The accompanying cut (Fig. 160) shows the stone outlined in the negative skiagram as it was found at operation.

You noticed how large I made the incision: never try to remove a kidney through a small incision. The detection of the stone in the ureter by palpation shows the wisdom of exploring the kidney before deciding to perform nephrectomy. For twenty six years now we have removed stones from the pelvis of the ureter by direct incision through the pelvis instead of going through the cortex; the advantages of this route are that there is less hemorrhage and far less liability of a subsequent fistula, for the ureter when cut unites more rapidly than any other tissue in the body except the peritoneum.

The causes of renal hemorrhage are, first and most commonly, stone; secondly, tuberculosis; thirdly, hypernephroma; fourthly, sarcoma; fifthly, carcinoma, which is much less frequent in the kidney than sarcoma; and finally, infarction.* In a paper entitled "The Etiology of Unilateral Renal Hematuria" Randall (*Jour. Amer. Med. Ass.*, January 4, 1913, 10–13), taking up the question of essential hematuria, expresses the opinion that congestion acts as the *primum movens*, an extrinsic lesion plus a resulting intrinsic congestion causing the unilateral bleeding. After dividing the cases into three groups according to the etiology, Randall closes with the statement: "While from the point of view of the patient who desires to be rid of this constant drain on the system, and from the point of view of the surgeon who is consulted whatever the ultimate pathologic condition is,—and it may be one of a large category,—we are to consider that the actual etiologic factor causing the hematuria is renal congestion, and that this is most surely and successfully relieved by the performance of nephrotomy."

In a paper upon unilateral hematuria R. L. Payne, Jr. (*Surg., Gynec. and Obst.*, July, 1916, 76–9), states: "Briefly, to summarize, we have a case of so-called essential hematuria which shows in the kidney removed that macroscopically the only part of the organ involved in a pathologic process is the papillary area.

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* Riesman, of Philadelphia, in an unpublished paper, writes: "It is important to bear in mind that an infarct of the kidney may be mistaken for stone, as well as for unilateral nephritis and appendicitis."

"Microscopically the cortex and medullary portion is pathologically negative, while the papillæ show definite lesions as follows (Figs. 161 and 162): (1) Numerous microscopic calculi; (2) overgrowth of connective tissue; (3) hugely dilated capillaries; (4) calculi lying in close apposition to dilated capillaries; (5) dilated capillaries in a network on the free surface of papillæ, many of which are ruptured, with free blood escaping.

"Finally, after five years of study of so-called essential unilateral hematuria, both clinical and experimental, together with an intimate knowledge of the literature, this is the first instance known to us where the definite source of the hemorrhage and the probable cause thereof in a case of symptomless unilateral renal hemorrhage is shown."

A later paper by the same author was read at the Detroit Meeting of the American Medical Association.

In a critical review of 157 cases of stone in the kidney and ureter read in June, 1915, at the San Francisco meeting of the American Medical Association, Cabot states that the number of cases in which unnecessary abdominal operations are performed through failure to detect a stone is "far too large to be a credit to the medical profession." Of the 157 patients, 26 had had such operations, which were distributed as follows:

TABLE SHOWING 26 UNNECESSARY OPERATIONS IN 157 CASES OF URINARY CALCULUS

Appendectomy without relief of symptoms	10
Exploratory laparotomy	7
Fixation of the kidney	4
Operation for gall-stones	1
Adhesions not found to exist	1
Decapsulation of kidney	1
Salpingo-oöphorectomy	1
Suprapubic cystotomy	1

(The subject of ureteral calculus with additional statistics, diagrams, and bibliography was covered in Vol. IV, October, 1915, 931–45.)

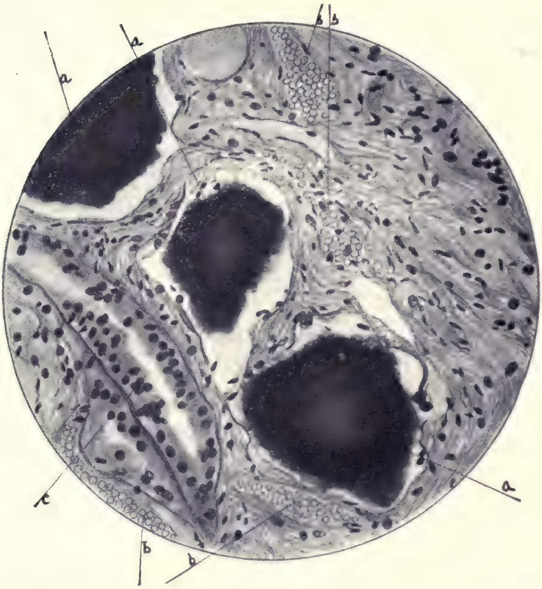

Fig. 161.—Camera lucida drawing, Leitz obj. 1/6, oc. 2. Three calculi are shown at *a*, surrounded by a proliferation of connective tissue. At *b* are seen dilated capillaries packed with blood-cells; *c*, a papillary duct cut in its long axis (Payne).

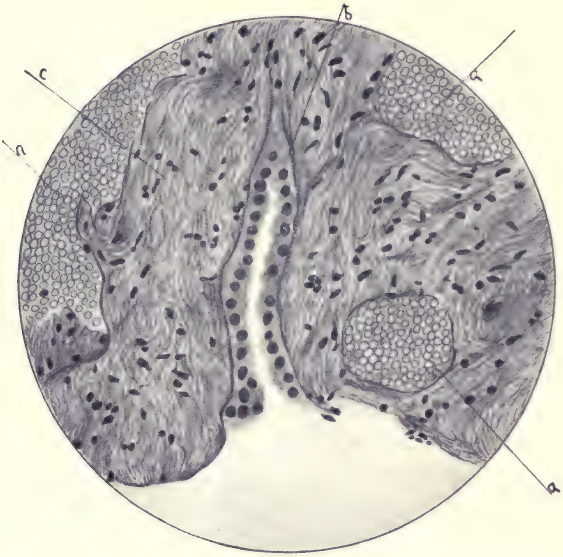

Fig. 162.—Camera lucida drawing, Leitz obj. 1/6, oc. 2. Taken from a section through the apex of a renal pyramid. At *a* the enormously dilated venous spaces are seen. The connective-tissue overgrowth at *c* is marked. At *b* is seen a papillary duct cut in its long axis (Payne).

Postscript.—There was no leakage of the urine through the loin, showing that the patient had a primary union of the ureteral pelvis. He left the hospital in three weeks completely healed.

Addendum.—The following is the further history of the case of ureteral calculus which was presented in Vol. II, April, 1913, 287–293:

A female, twenty-five years of age, was readmitted to Mercy Hospital November 1, 1915. At the previous operation on January 29, 1913, a tunneled stone of the mulberry type was removed from the right ureter, in which it was found impacted at a site 2½ inches below the kidney and just above the crest of the ilium.

On October 1, 1915, the patient had an attack of pain in the left lower quadrant of the abdomen. At first dull and aching, in five or six hours the pain became intense, sharp, and cutting: it remained intense for about twelve hours, and then gradually subsided. When the patient had this pain, she was nauseated, but did not vomit. There was neither chill nor fever. The pain did not radiate.

From October 1st to 15th the patient had about eight attacks of severe pain. During one attack (October 8th) she had to urinate six or seven times during the night. Since October 15th she has had no severe pain—only slight tenderness in the left lower quadrant. She has not noticed blood in the urine.

The skiagram revealed a small stone impacted in the left ureter at a site about 3½ inches below the kidney. This stone was removed in the manner described in the preceding case, but the incision was made somewhat lower down. Before making the incision, a ureteral catheter was passed up to the stone, which was encountered still impacted at the same site as the skiagram showed: occasionally the passage of a catheter starts the stone moving, and it may keep on moving until it is passed.

The patient made an uneventful recovery and left hospital in the usual time.

SARCOMA OF ILIUM—EXPLORATORY LAPAROTOMY—CONSERVATIVE TREATMENT

Summary: Clinical history of patient; comments—differential diagnosis from sacro-iliac strain; operation—exploratory—specimens removed for examination; postoperative comments—correlation of clinical history with pathologic findings; total excision of ilium not advisable; possibilities of cure by sodium cacodylate and Coley's serum; mode of administration of former; value of the various Abderhalden tests.

CLINICAL HISTORY OF PATIENT

A MALE, forty-three years of age, was admitted to Mercy Hospital December 2, 1914. The family history reveals that an aunt died of pulmonary tuberculosis at the age of twenty-one years: there is no history of malignant neoplasms. The patient never had a chancre nor any other infection, such as "rheumatism," or even fever or chills. Closer questioning, however, elicits a history of gonorrhea in 1897, and a mild attack of erysipelas in 1901.

In 1911 the patient fell through a floor, striking upon his back: he was laid up in bed for one week and wore a corset for two months afterward.

In January, 1914, the patient complained for the first time of pain in his right lower extremity: he described the pain as resembling a toothache, and said that it radiated from hip to anterior surface of ankle; when he attempted to cross the right leg over the other the pain was aggravated—this put his iliacus muscle on tension, and made traction on the diseased portion of the ilium. There was neither chill nor fever.

Five months later, in June, 1914, the pain became much worse, now radiating to the pelvis: it was aggravated by moving about much.

In July, 1914, the patient had to walk with the aid of a cane. When getting into a motor he had to lift the affected leg into the machine with his arms, again showing a lesion involving the iliacus attachment. He could sleep comfortably during the night if he did not put weight on the leg: he has never been awakened at night by stabbing pains.

The patient was lame throughout the entire summer, and the malady continued to grow worse, annoying him when he was walking about as well as when sitting down.

In the middle of October, 1914, the limb was immobilized by a plaster-of-Paris splint, but this agent afforded no relief. After the gypsum case was removed a brace was applied, but this the patient could stand for only a couple of hours.

Since November the patient has been almost helpless, being obliged to use crutches for locomotion. He keeps his weight off the affected limb in order to avoid the pain.

At the present time sitting erect gives rise to severe pain, not only in the limb itself and hip, but also in the back. The pain seems to be deep seated. There is unrestricted motion at the hip.

COMMENTS

Dr. Murphy (December 9, 1914): This case has run over a long period of time, and various diagnoses have been made: the original diagnosis was sacro-iliac strain—a lesion which the patient never had. At first he did not have pain when he walked, but when he extended the thigh upon the trunk: pain of this sort is due to tension thrust upon the iliacus and psoas muscles, which are attached to the ilium.

Our diagnosis in this case is sarcoma, and today we propose to remove a specimen for microscopic verification of the clinical diagnosis.

OPERATION

[Through an exploratory laparotomy incision a large, fleshy mass was exposed, extending from the margin of the ilium forward quite close to the skin. Three specimens were taken from the mass, of which two were put in sterile test-tubes for cultural purposes and the third was sent over for microscopic examination. The wound was closed without drainage.]

POSTOPERATIVE COMMENTS

I am sorry for the patient; but establishing the correct diagnosis does not influence the natural course of the disease deleteriously, nor injure the patient's prospects. Careful analysis of the history shows that it is fairly typic for sarcoma of the pelvis. The patient suffered from pain, it is true, but that pain was never in the tumor itself: it was always referred downward along the course of the anterior crural nerve; this nerve is involved where it crosses the wing of the ilium. The pain which arises when we extend the thigh upon the trunk is due to the tension which is thereby thrust upon the iliacus muscle, which, when tense, subjects the anterior crural nerve to pressure between the tumor and the muscle itself.

While the entire ilium has been excised by Kocher, Keen, Bardenheuer, and others, yet in this case the chances of getting the tumor out *in toto* and not having a return are not worth the attempt. I advise for this patient Coley's serum in very large doses, and rapidly ascending doses of sodium cacodylate. In giving the sodium cacodylate treatment we begin with 3 grains three times a week, and then increase to 4 grains three times a week, ascending 1 grain three times a week until 10 grains are being administered three times a week at each injection. Some cases of sarcoma undoubtedly get well under this treatment, although we do not know why: ever since arsenic has been accepted as a medicament we have known certain cases of so-called sarcomatous tumors to disappear under its influence, even though the percentage which gets well is very small. I recall one case of this type—a case of sarcoma of the uterus, which operation showed to have become attached to all regional structures, rendering the condition wholly inoperable. We sent the patient home with instructions how to take the sodium cacodylate treatment. Today—three and one-half years afterward—the tumor has entirely disappeared. (For a full exposition of the sodium cacodylate treatment consult Vol. IV, October, 1915, 952–4.)

It is a clinical observation that some sarcomata get well under certain forms of treatment, while many do not get well under the same treatment. We have been hoping that Coley would eventually devise some method that would help a large percentage of cases of sarcoma, for as it is now only a very small percentage of those patients to whom Coley's serum is given get well. With us no case has completely recovered under this serum treatment.

We made the Abderhalden sarcoma test on this patient, and it turned out to be positive, so that we have one additional prop to lean upon in establishing the diagnosis. We are using the Abderhalden pregnancy test, the Abderhalden sarcoma test, and the Abderhalden carcinoma test: while these tests are not wholly reliable, yet the first, or pregnancy test, is fairly reliable when negative for pregnancy, *i. e.*, if you do not get a positive Abderhalden you may rest fairly well assured that pregnancy does not exist. You may, on the other hand, get an Abderhalden test which indicates pregnancy when no pregnancy is present, so that it has a positive-negative value in that sense. We have not as yet tried the Abderhalden tuberculosis test.

(In connection with this case consult Vol. IV, October, 1915, 947–67.)

Postscript (*June 15, 1916*).—Notwithstanding that the patient had had the injury in 1911, and that in 1914 he first showed the gross evidences of his trouble, he is still under the sodium cacodylate and Coley serum treatment. The tumor is about a third of the size it was when he first submitted himself for treatment. One of the striking facts is that there are no evidences of metastases and his general condition is good.

Pathologic Report: Microscopic examination showed the tumor to be a mixed round- and spindle-celled osteosarcoma.

In a paper entitled "Sarcoma of the Scapula: Histologic Diagnosis Made by Study of Blood Aspirated From Pulsating Portion of the Tumor," Royce (*Surg.*, *Gynec. and Obst.*, July, 1916, 74–5) writes: "The cytologic study of the various exudates is a well recognized laboratory procedure, and has a proved value in distinguishing between neoplasms and various types of inflammatory processes affecting the linings of the serous cavities.

That a similar study of fluids aspirated from tumor-masses may have a like value seems possible from the instance I shall relate.

"Among the specimens coming to the laboratory recently was ten cubic centimeters of fluid blood. The accompanying request card stated that the fluid had been aspirated from a tumor of the shoulder which was tentatively diagnosed as sarcoma, and asked for the nature of the fluid. The fluid was allowed to stand over night at room temperature. The next morning it was clotted. Ten per cent. formalin was added without disturbing the clot. The following day a portion of the clot was removed and imbedded in paraffin. Sections from this block stained with hematoxylin and eosin present beautiful pictures of islands of sarcoma-cells imbedded in a matrix of fibrin and red cells. The cells are of the small round variety, and mitotic figures are frequently seen."

ANCIENT FRACTURE OF RIM OF ACETABULUM WITH DISPLACEMENT OF HEAD OF FEMUR—ARTHROTOMY OF HIP-JOINT—REDUCTION OF FRACTURE

Summary: Clinical history of patient; comments—nature of injury; difficulties of reduction; operation—reduction of deformity; tenotomy of adductors; limb dressed in abduction; postoperative comments—consideration of other injuries of acetabulum. Note on the artificial impaction of hip fracture.

CLINICAL HISTORY OF PATIENT

A MALE, thirty-five years of age, was admitted to Mercy Hospital October 22, 1915.

Four months previously, on June 25, 1915, while motoring at the rate of 30 miles an hour, the car suddenly turned turtle, imprisoning the patient by resting upon his left hip: a long lateral splint was applied for a suspected fracture of the neck of the femur and retained during the patient's three-months' stay in bed. During the remainder of the time since the accident (one month) the patient has been walking about with the aid of crutches and at each step notices crepitation in the hip.

At present there is no pain in the hip.

Examination by Dr. Murphy (October 22, 1915).—The great trochanter is very prominent and rotates through the same full arc as when the femoral neck is not fractured. The head of the femur may be felt in its displaced position upon the dorsum of the ilium, and associated with it is the fractured and separated postero-superior portion of the rim of the acetabulum: a small fragment has been chipped off from the head of the femur. There are about two inches of shortening: preparatory to operation Buck's traction apparatus—with a weight of 35 pounds and with the limb in the abducted position—will be applied as a means of overcoming this shortening.

COMMENTS

Dr. Murphy (November 11, 1915): The injury from which this patient suffers is primarily fracture with separation of the posterosuperior portion of the rim of the acetabulum; secondarily, displacement of the head of the femur—capped by the fragment of the acetabular rim—onto the dorsum ilii. The operative indications are first reduction of the deformity and, secondly, retention of the reduced acetabular rim and femoral head. The obstacles to reduction of the femoral head are first the marked contraction of the adductor muscles and, secondly, the complicating fracture of the acetabular rim. The reduction of an ancient case of acquired dorsal luxation of the femur is one of the most taxing of the physical efforts which one must make in the domain of operative surgery: to effect reduction at all it is at times necessary to resect the head of the bone; but in this case, instead of removing the head, use will be made of it as a lever in effecting the reduction. When one first attempts such a reduction he attempts it with a great deal of assurance, but after his first case his assurance is forever banished: while it is many years since we attempted our first case, yet the memories of it linger and have impressed upon us a realization of the difficulties to be anticipated.

OPERATION

[Posterior aspect of hip-joint exposed through usual U-shaped incision (Vol. V, February, 1916, 89—illustrations in Vol. III, August, 1914, 665–667).] . . . Now you can see the posterosuperior fragment of the acetabular rim, which was carried up onto the dorsum of the ilium by the head of the femur, and the small fragment which was separated from the head of the femur. The way is paved for the return of the head to the acetabular cavity, and we accomplish this by the use of bone-skids: the acetabular fragment, too, reaches its normal position. This reduction of the head, however, immediately throws great tension upon the contracted adductor muscles: the possibility of luxation recurring from this cause must be obviated by performing tenotomy of these muscles just below their origin. . . . Now we are enabled to swing the limb around into the position of abduction, and it will be kept thus immobilized for ten weeks by means of a Rainey double-abduction splint (Vol. I, April, 1912, 173). [Wound closed without inserting drainage, dressed, and splint applied.] . . .

POSTOPERATIVE COMMENTS

There are other injuries to which the acetabulum is subject. Neuhof (*Annals of Surgery*, September, 1914, 367–370) reported a case of traumatic intra-acetabular epiphyseal disjunction of the innominate bone not associated with other lesions of the pelvis. A child, six and one-half years of age, stumbled and fell upon her left hip: skiagram revealed the ilium separated from the ischium and pubis, but no separation between the latter bones; the head of the left femur lay more deeply in the acetabulum than that of the normal side. Neuhof refers to the similarity between this lesion and the simple and limited fractures of the cotyloid cavity of adults, which were first reported by Kontorowitch ("Thèse de Lyon," 1913) and Thévenot (*Revue de Chirurgie*, February, 1904; *Revue d'Orthopédie*, March, 1904), and in which the skiagram showed either a linear fracture or an upright or inverted Y-shaped one. Neuhof believes that this simple and isolated fracture of the cotyloid cavity is but the early stage of what, with greater vulnerating force, results in the fracture of the floor of the acetabulum described by Skillern and Pancoast (*Annals of Surgery*, January, 1912, 93–98), and states that the striking analogy between the latter and his case lead him to believe that they are the adult and the juvenile representations of one lesion.

An important contribution to the treatment of intracapsular fracture of the neck of the femur was published recently (*Annals of Surgery*, March, 1916, 366–371) by Frederic J. Cotton, of Boston, under the caption: "Artificial Impaction of Hip Fracture." Cotton writes: "Briefly, it comes to this. Unimpacted fractures of the femoral neck proper never unite by bone; well-impacted fractures do so unite, almost always. Obviously, the conversion of cases of the first into cases of the second class is extremely desirable. Can it be done? I assert that it *can* be done; that it can be done without damage and without great difficulty, and can be done at any time within a fortnight at least, whether we are dealing with a fracture thoroughly loose when we first see it, with one which has loosened up in the first fortnight, or with one in which we have deliberately sacrificed the original impaction to secure improved position.

"The breaking up of hip fractures is far from new. I saw it done when I was a house officer, but the attempt to establish or reëstablish a condition of impaction I believe to be entirely new, and its possibility rests, to date, entirely on the data I have here. There are 21 cases with 1 failure and 1 prospective failure. The first case was impacted on August 31, 1909. . . .

"I do not wish to be taken as advocating forcible impaction in all cases, even of neck fracture proper. Not a few of such cases are simply cracks. Many show a sufficient accidental impaction, with deformity in adduction and eversion not great enough to warrant any interference. Some, of course, that show deformity enough to render correction desirable are poor surgical risks. . . .

"What I do maintain is that in all cases of loose fracture, in all cases in which impaction gives way, in all cases in which adduction and eversion deformity promise definitely poor results, the procedure herewith given is indicated, and should be carried out unless there are definite contraindications.

"The technic I have followed is this:

"First anesthetize the patient—not deeply—and put him on the table; preferably a Hoffa table, though even an ordinary wooden table will do. After measuring the length, drag the leg down (with your stockinged foot in the perineum) till the length comes out even, and until rotation gives definite slight crepitus; then correct any eversion deformity present; give the leg to an assistant; have another assistant give counterpressure on the opposite side of the pelvis; pad the trochanter with two thicknesses of saddler's felt, and pound on it with a very large wooden mallet till there is a sensation of 'giving.' The blow should be a slow, swinging, 'following' blow, and the 'giving' is very definitely felt in most cases. Then one should test the fact of impaction by the loss of mobility in rotation when the leg is released. When the job is properly done, this loss of mobility is perfectly definite and rather striking. After impaction, the length of the two legs should come out very nearly even.

"After all this is done, I put the leg up in an abduction spica of plaster. Abduction prevents adductor contracture, often troublesome in the period of reëstablishment of function. It neutralizes the tendency to coxa vara from muscle-pull, and is a more convenient position in respect to the bed-care of the patient. . . .

"The first plaster I leave on six to eight weeks or longer. Not until three months do I dare let the foot to the floor. Repair in these cases is slow at best. Always in hip fracture at the neck there is a considerable absorption. Even with the *x*-ray, we cannot always judge and it is best to be cautious. From three to six months one is busy with getting the joint mobilized and learning to walk with crutches, bearing little weight on the hurt leg. During this time, nearly all the motion should be regained. After six months the question is one of use, of regaining strength and losing the limp."

LUXATION OF HIP-JOINT (TWO CASES). CASE I.—ACQUIRED OBTURATOR TYPE—REDUCTION BY OPEN METHOD. CASE II.—CONGENITAL TYPE—REDUCTION BY OPEN METHOD

Summary: Case I.—Clinical history of patient; comments—interpretation of lesion from analysis of history; metamorphosis of luxation from one type to another; outline of plan of operation; table of hip-luxations; operation—exposure and reduction of luxation—tenotomy of adductors; postoperative comments—after-treatment; principles of primary reduction—the mechanic *vs.* the scientific method.

Case II.—Clinical history of patient; comments—owing to lateness of case bloodless reduction offers little hope; obstacles to bloodless reduction; open operation—reduction effected.

CLINICAL HISTORY OF PATIENT

A MALE, thirty-six years of age, was admitted to Mercy Hospital January 22, 1916.

The patient is suffering from an unreduced obturator luxation of the left hip of sixteen years' standing. The injury was received in 1900, when the patient fell from a wagon: an immediate attempt at reduction proved unsuccessful, and a second attempt one month later likewise failed.

Marked lordosis and scoliosis have resulted as compensatory reactions to the patient's use of the crippled limb: pains and aches arise when he stands or walks much. A recent skiagram reveals luxation, but no fracture.

COMMENTS

DR. MURPHY (January 24, 1916): That is a very interesting history, and it tells just what happened: first, the head of the femur was luxated posteriorly upon the dorsum of the ilium, and then the attempts at reduction carried the head downward and left it below and to the inner side of the acetabulum, thus changing the dorsal luxation to the downward type, obturator variety. Such a metamorphosis of type from the dorsal luxation—which is the commonest—to any of the remaining four types given in the accompanying table, is not infrequent.

TABLE OF VARIETIES OF HIP-LUXATION ARRANGED IN ORDER OF FREQUENCY

1. Dorsal:
    - (*a*) Iliac.
    - (*b*) Ischiatic.
2. Downward:
    - (*a*) Obturator.
    - (*b*) Perineal.
3. Forward:
    - (*a*) Suprapubic.
    - (*b*) Subspinous.

Double..............32 cases.
Compound..........10 "

What little motion there is is perfectly free, even though the hip is flexed and shows the absence of bony ankylosis. The limb cannot be extended on account of the absence of the head from the acetabulum and its presence over the obturator foramen.

The luxation is of sixteen years' standing, so that reduction will be difficult. Of course, owing to the pathologic changes which have taken place in the regional soft structures during that time, reduction by bloodless methods is out of question. At the time of open reduction the contractured adductor group of muscles will have to be tenotomized, and if the acetabular cavity is filled in it will have to be reamed out. It may be that a fragment of the head of the femur has been broken off and left remaining in the acetabulum, as in the case reported in Vol. IV, December, 1915, 1183–1189, Fig. 315, but we are inclined to think that complication does not obtain here, since in the skiagram the head appears to have a fairly normal contour.

We shall approach the joint through our usual posterior incision as for arthroplasty, thus preserving a large area of fascia lata from which an interposing flap may be obtained in case we fear the development of ankylosis after reduction, but I do not wish to perform arthroplasty if I can possibly avoid it.

OPERATION

[The usual goblet-shaped incision was made, encircling the great trochanter, and the flaps of skin and superficial fascia were elevated and retracted, exposing the trochanter and the gluteus maximus muscle. The latter was found displaced and somewhat distorted by the luxated femur. Since it was desired to preserve the trochanter intact instead of separating its tip with the chain-saw and reflecting it upward with the attached gluteal muscles in the usual manner, the gluteus maximus muscle was split in the direction of its fibers, and the edges were retracted, exposing the underlying structures. The external rotators were separated subperiosteally from the great trochanter and reflected upward, backward, and inward toward their origins, exposing the acetabulum. The capsule was not recognizable as such, and the head of the femur was embraced by a dense mass of fibrous tissue, which was freed by division. By abducting the femur, elevating and rotating it outward, the head was disengaged from its obturator position and lifted over the lower portion of the margin of the acetabulum into the cavity of the latter, which it entered with surprising and unexpected facility. The muscles were reunited in successive order, and the superficial fascia and skin were closed without drainage. The adductor group of muscles was tenotomized, but not extensively, for it was desired to maintain a high degree of muscle-pressure against the head of the femur and the acetabulum.]

POSTOPERATIVE COMMENTS

From now on this case will be managed just as though it had been a congenital luxation: it will be immobilized in the "frog" position for twelve or fourteen weeks, until a capsule has developed with sufficient strength to support the joint of itself.

In the reduction of such a luxation there are a few principles to be borne in mind: never attempt to reduce a hip-luxation mechanically, but do it scientifically. Get a clear mental picture of the relation the luxated femoral head bears to the pelvis, and reduce it, not blindly by sheer force of strength, but by retracing the path followed by the head when it was luxated. In obtaining this conception the history of the mechanism of the luxation is most helpful: ask the patient to state exactly what happened when the luxation occurred. What was the position of the limb when the accident happened? For example, when a patient strikes on the side and falls backward, as sometimes occurs in trench-digging, the thigh will be adducted. To the conception of the mechanism of the injury there must be added the results of physical and of skiagraphic examination. Was the head of the femur disturbed from its original resting-place after luxation by unsuccessful attempts at reduction? In this case, for example, two unsuccessful attempts resulted merely in displacing the head from the primary dorsal position to the secondary obturator, with concomitant increase in the length of the affected limb. Of course, a certain amount of physical force is necessary in effecting reduction, but never to the extent of fracturing the neck of the femur—an accident which has been known to happen, although one is scarcely able to realize how it could occur.

Postscript (*March 7, 1916*).—It is now six weeks since the operation was performed. The patient is walking around with the aid of crutches, and the result is splendid.

CASE II

CLINICAL HISTORY OF PATIENT

A FEMALE, ten years of age, was admitted to Mercy Hospital December 30, 1915. The patient was born in the course of a normal delivery (cephalic presentation), without instrumentation or undue manipulation: no deformity was noticed at birth.

The patient is afflicted with congenital luxation of the right hip. She began to crawl when fourteen months of age, and to walk about at twenty-eight months. When she began to walk about the parents noticed a waddling gait and a right-sided limp: the waddle became more and more pronounced as the child grew older.

COMMENTS

Dr. Murphy (January 11, 1916): This is a very difficult case of congenital hip-luxation because so late—extremely late to try to reduce it by the bloodless method. An attempt will be made, however, to reduce it by the latter method, but in the event of failure,—which is to be expected in this case,—an open operation will be necessary. Dr. Kreuscher will attempt to effect bloodless reduction.

BLOODLESS OPERATION

Dr. Kreuscher: The patient has heretofore received no medical attention for the luxated hip, with the exception of the 10-pound extension which we have had on for the past ten days in an effort to stretch the muscles, which are well developed. The affected limb is shortened to the extent of 4.5 cm.

We shall first stretch the adductor muscles, as we dislike to tenotomize them, since they assist in retaining the head after reduction. . . . We are now trying to push the head downward to below the level of the acetabulum. . . . It does not seem to give one fraction of an inch, so far as I am able to determine by palpating from the outside: we shall therefore discontinue our efforts and reapply the extension, maintaining it up to the time of the open operation.

* * * * * * * * * * * * * * * * * * *

OPEN OPERATION

Dr. Murphy (January 27, 1916): The patient has passed the age when reduction may be effected by the bloodless method. So many years have elapsed since the birth of this child that the probabilities are that by this time the acetabulum is completely filled in, so that it presents a plane, instead of a concave, surface: if this is the situation the acetabulum may be deepened with the reamer, or a new one may be formed nearby. The skiagram is deceptive, since it apparently shows the head to be in the acetabulum: it is not in the acetabulum, however, but just behind it. If ankylosis should develop as the result of this open reduction, it may be overcome by performing arthroplasty when the patient has attained her full growth, but we prefer not to have ankylosis develop. Open reduction should never take precedence over the bloodless method.

OPERATION

[The joint was exposed by the method described in the preceding case. The obstruction to reduction lay in a purse-like constriction of the capsule at the cotyloid cartilage. On dividing the capsule the acetabular cavity was found to be of fair depth and provided with a fairly good rim. A skid was placed upon the acetabular margin, and the head was lifted upon the skid and guided home. The dead space occupied by the head of the femur previous to reduction was obliterated by sutures; the operative wound was then closed in the usual manner and without drainage. Very little blood was lost during the operation, and the work was performed by the no-hand-contacting method. Both hips were incased in plaster in the "frog" position.]

(The bloodless method of reduction has been fully discussed and copiously illustrated in Vol. IV, December, 1915, 1159–1181.)

Postscript.—The skiagram made subsequently showed that the head had not remained in the superficial acetabulum, but had slipped into the anterior position and is now directly anterior to the acetabulum. The wound healed *per primam.* There was remarkably little constitutional disturbance considering the difficulties of making the rotation and the extent of the operation. There was practically no blood lost. The plaster case was kept on with the head in this anterior position to develop a new joint on the same basis that it would be in an anterior luxation by the bloodless method.

ANCIENT BONY ANKYLOSIS OF HIP-JOINT WITH EXCESSIVE FLEXION-DEFORMITY —RELEASE OF ANKYLOSIS, RESECTION OF HEAD OF FEMUR; TENOTOMY OF ADDUCTORS

Summary: Clinical history of patient; comments—excessive degree of flexion-deformity; choice of operation; the importance of avoiding ischemia and paralysis when straightening the limb; arthroplasty abandoned because of the great pressure to which the interposing flap would be subjected; nature of the lesion; flexion-deformity avoidable; operation—head of femur freed from acetabulum and one inch of it resected: tenotomy of adductors.

CLINICAL HISTORY OF PATIENT

A MALE, forty-four years of age, was admitted to Mercy Hospital February 15, 1916. The family and past histories are negative.

The patient complains of stiffness of the right hip. When thirteen years of age he began having pain in the lower portion of the spine and the right hip and knee: the trouble was diagnosed "inflammatory rheumatism," and the patient was incapacitated several months.

Two years after the onset of the trouble an abscess formed about the right hip-joint, pointed, and evacuated itself spontaneously: the resulting sinuses discharged pus but no sequestra for three years before closing. Since that time the hip-joint has been fixed by bony ankylosis, and the leg has been flexed to an acute angle of 45 degrees with the body.

Some years later, after a prolonged period of indoor work as a school-teacher, the patient noticed that the cervical lymph-nodes were enlarging: suppurative infection ensued, the resulting abscesses pointed, evacuated themselves, and gave rise to sinuses which discharged for three years.

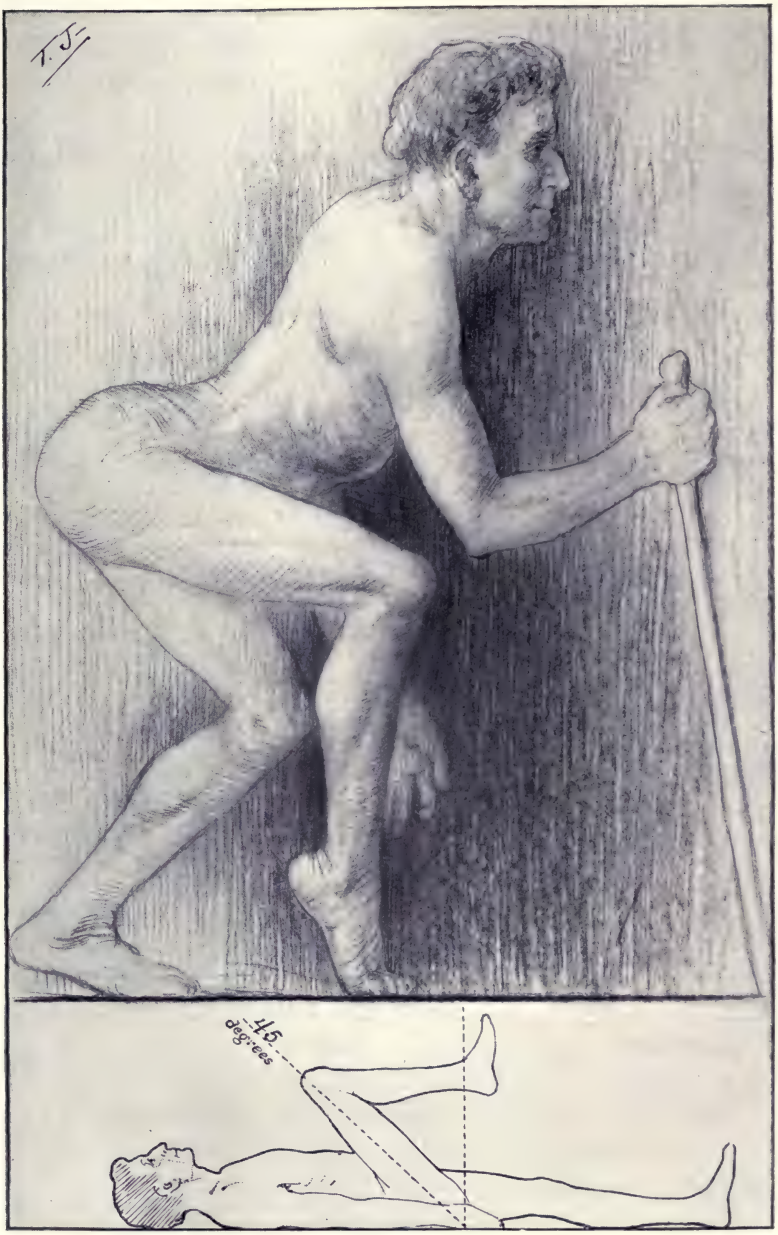

Fig. 163.—Attitude of patient when walking, owing to excessive flexion-deformity of right thigh. Insert shows degree of fixed flexion angle.

The patient has had no manifestation of active motion in the hip-joint for about thirty years. He walks stooped forward to permit the foot of the flexed right leg to reach the floor (Fig. 163). His general health is good.

Examination shows that the pelvis is on the same plane as the floor, and that the thigh is flexed to an elevation of 45 degrees from the chest (Fig. 163).

COMMENTS

Dr. Murphy (February 16, 1916): This case presents the most difficult problem that I have had to attack since I have been engaged in bone- and joint-work. Even with the limb in this extreme degree of flexion the patient is able to use it for locomotion, so that you can imagine how he must hobble about with his face to the ground; he is about six feet tall.

The choice of operation lies between resection of the hip-joint, osteotomy, arthroplasty, or a subcutaneous tenotomy with possibly a fracture of the neck for restoration of position, and the selection of one or other method revolves upon the feasibility of inserting an interposing flap. Owing to the great degree of flexion-deformity and the many years it has existed, in releasing the contractures and straightening the limb great care must be taken lest too much tension should suddenly be thrust upon the blood-vessels, which is so liable to result in gangrene of the leg from traumatic endarteritis obliterans. If, after straightening the limb, there is insufficient space between the femur and the acetabular cavity to guarantee against necrosis of the flap from pressure, we must be content with simple resection of the upper end of the femur, hoping to be able to perform arthroplasty at a more favorable time, when the overstretched tissues have relaxed and accommodated themselves to the limb in its new position of extension.

As to the nature of this patient's hip-trouble, we regard it as a primary tuberculous with a secondary metastatic mixed infection.

Such an extreme degree of flexion as this is always avoidable, and the responsibility for it rests upon the shoulders of the attending physician: ankylosis may result from the pus infection, but the flexion-deformity can be prevented by maintaining the limb in a straight position with a Buck's extension during the acute manifestation of the joint-infection. Now, in addition to the danger of ischemia from overstretching the artery, there is the danger of paralysis from the same variety of trauma to the anterior crural nerve.

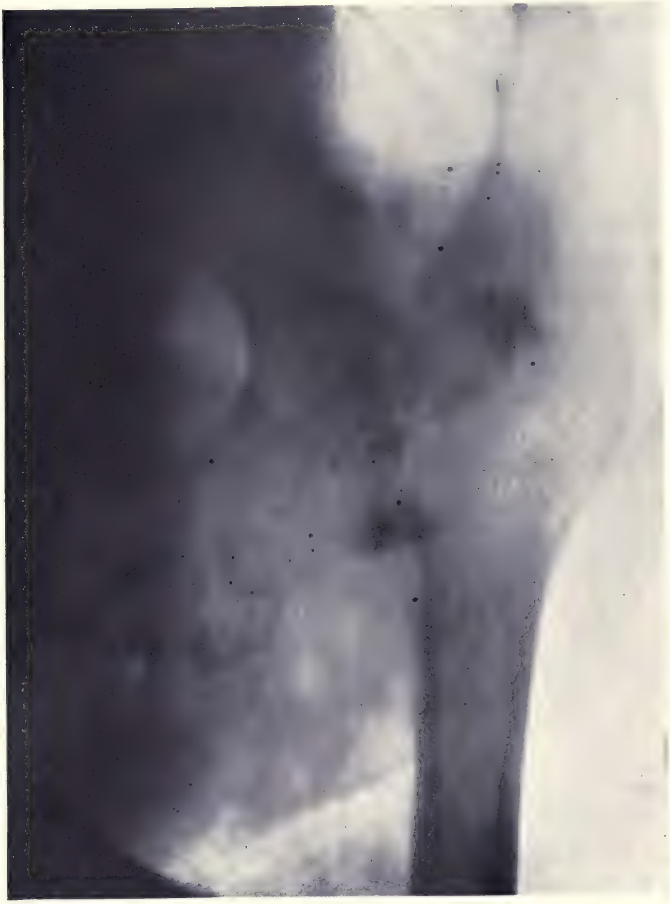

Fig. 164.—Postoperative skiagram showing neck-stump of femur apposed to acetabular cavity after resection of hip-joint for bony ankylosis.

OPERATION

[The hip-joint was exposed through the usual external goblet-shaped incision. (See Vol. V, February, 1916, 89.) About the ankylosed joint there was found a very extensive degree of ossific deposit, which involved the inner margin of the acetabulum, and of the neck of the femur almost to the lesser trochanter, and which fixed the femur to the outer margin of the tuberosity of the ischium. This hyperplasia of the bone was nature's effort to maintain the strength of the neck at the great mechanical disadvantage at which it was placed on account of the angle at which it had to carry the weight of the body. Notwithstanding this large amount of bone-proliferation, six insertions of the curved chisel sufficed to separate and release the head from the acetabulum, the head being delivered with almost its normal anatomic conformation preserved. After reaming out the acetabular cavity and tenotomizing the adductor group of muscles in an effort to relax the limb, it was still found that there was too much tension upon the anterior soft structures when an endeavor was made to bring the limb straight, and that, owing to this tension, there would be too much pressure upon the interposing flap, so that arthroplasty was abandoned. After resecting one inch of the head of the femur, the anterior structures were further relaxed, and the chance of paralysis or ischemia developing was greatly lessened: the femoral artery could be felt pulsating in Scarpa's triangle.

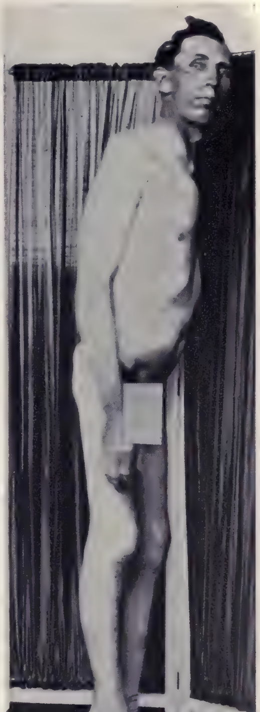

Fig. 165.—Postoperative result after resection of head of femur. Note correction of flexion-deformity shown in Fig. 163.

Next the stump of the femur was apposed to the acetabular cavity (Fig. 164) without the interposing fascia or fat flap, as I felt that the muscular pressure necessary to maintain the limb in a straight position would necrotize any flap I might interpose, and the wound was closed by restoring the resected tip of the great trochanter to the base, and then suturing the cut gluteal muscles, the fascia lata, the superficial fascia, and the skin. No drainage was inserted.]

Postscript.—After the operation there was some swelling of the scrotum, but this disappeared by February 25th. On March 7th the plaster spica was still in place, and there was good movement of the toes. There was a primary union and the circulation in the limb was maintained from the beginning. On June 16th the patient was up on crutches.

July 11, 1916: The patient is about ready to go home. As near as can be told he has a bony ankylosis, with the limb in the straight position (Fig. 165).

EXTENSIVE TROCHANTERIC BURSITIS—TOTAL ABLATION

Summary: Clinical history of patient; comments—correlation of history with physical findings; differential diagnosis—osteomyelitis of femur, pressure-sciatica, infection of hip-joint; common sites of bursal infections—the "glass-arm" of baseball pitchers; octopus-like nature of trochanteric bursitis and necessity of total ablation; operation—complete removal of bursa with it ramifications; pathologic report.

CLINICAL HISTORY OF PATIENT

A FEMALE, forty-two years of age, was admitted to Mercy Hospital April 27, 1916. The family history is negative. The patient suffers from chronic nasal catarrh and is subject to repeated colds.

The patient complains of occasional sharp, shooting pains in the left hip and rapid functional fatigue of the left lower extremity: she traces this trouble back to the time of her first labor, February 15, 1906. Following a forceps delivery she remained in bed three weeks: while in bed she had no fever and no pains or aches. When she got up she had difficulty with the left hip, although she had not lain upon it while in bed. She does not think the hip pained, but says that she "favored" it and would not bear weight upon it. Use of the limb was followed by rapid fatigue and aching in the hip and along the upper and outer part of the thigh. The hip was neither red nor swollen. This condition remained stationary for over seven years.

In 1909—three years after the onset of the trouble—the patient fell through a cellar door for a distance of 12 feet, landing upon the left side of the body—especially the hip and head—and being rendered unconscious. No fracture resulted, and no change in the previous condition of the hip followed.

Since July 24, 1913,—the date of the latest labor,—the hip-trouble has gradually become worse.

In the fall of 1913 the patient was in a runaway and was thrown to the ground: she does not know how she struck the ground, but states that she was not hurt and was able to get up immediately; no bruises or pains followed this fall.

In December, 1914, the patient began to have occasional shooting pains in the hip and side of the thigh.

On January 1, 1915, the patient noticed redness and swelling in the region of the great trochanter: these signs increased in intensity. This region became tender, and she could not lie upon that side: she had neither chills nor fever.

On January 15th an abscess was opened and packed: the patient remained in bed for three weeks, and there was some discharge from the wound for seven or eight weeks. She says the limb has been weaker since then, but not any more painful.

In February, 1916, while suffering from a slight cold, the left hip became somewhat swollen and more painful: there was no redness after this attack until three weeks ago.

The patient states that for the last two weeks she has experienced a marked burning sensation along the outer side of the hip and thigh after using the limb.

Examination by Dr. Murphy (*April 27, 1916*).—There is great thickening over the great trochanter of the left femur (Fig. 166): skiagram reveals a roughened, ragged condition of the bone (Fig. 167), but no erosion of the lesser trochanter or of the ilium, although the latter is somewhat thickened. The bursal extension seems to pass well forward anterior to the neck of the femur, and it is here that the greatest thickening exists. On the outer aspect of the thigh, and five inches below the trochanteric swelling, there is an induration which is apparently circumscribed, and which either communicates with the enlarged trochanteric bursa or is now shut off from it.

COMMENTS

Dr. Murphy (April 29, 1916): The patient's history is typic for metastatic infection of the trochanteric bursa of mild degree, the periosteum and finally the bone itself being involved from the repeated traumata. The primary source of the metastatic infection of the bursa may have been the chronic nasal catarrh from which the patient suffered, for while she was afflicted with a slight cold in February, 1916, the left hip became swollen and more painful; or the metastatic infection may have followed her first labor, in 1906. The skiagram suggests that the infected bursa had produced erosion of the tip of the great trochanter, which also shows hyperplasia and thickening of the bone beneath the periosteum. Cure can be effected only by total removal of the bursa and all its ramifications.

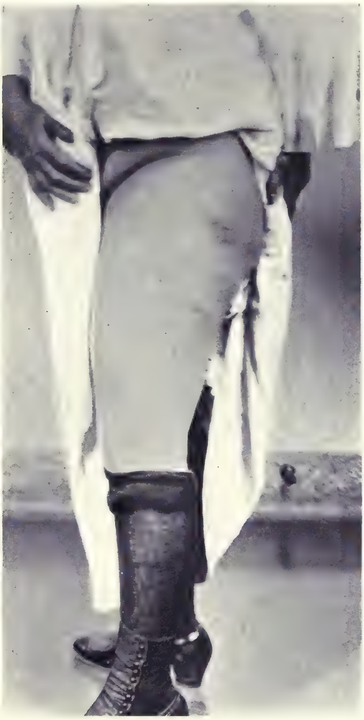

Fig. 166.—Surface appearance of trochanteric bursitis.

This case is very interesting, first, from a diagnostic standpoint, and secondly, from a clinical. Taking up the differential diagnosis, osteomyelitis of the femur—as of any bone—manifests itself usually within twenty-four hours and practically always within forty-eight hours, if of the acute metastatic type; but this

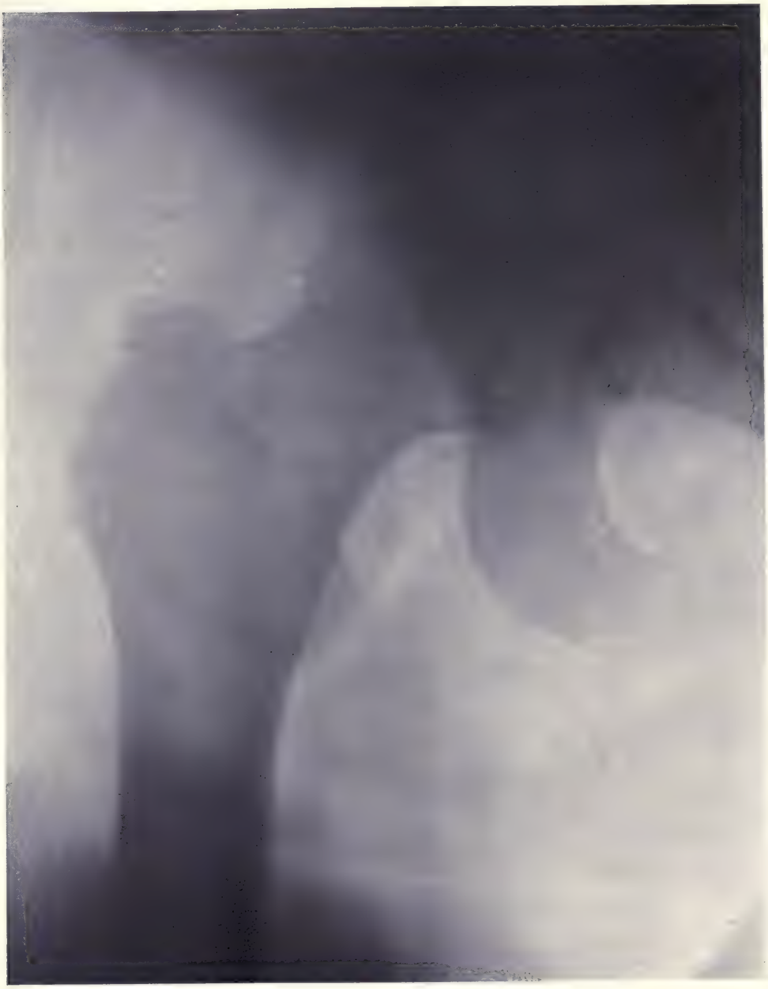

Fig. 167.—Preoperative skiagram of trochanteric bursitis, showing rough, ragged appearance of great trochanter, but no erosion of lesser trochanter or of ilium.

patient presented no such history, but a history of having had pain in the hip in 1906 and again in 1909, and of pain ever since.

In association with the first labor she might have suffered from pain the result of pressure upon the sacral plexus during parturition; or from metastatic infection of the hip-joint—a by no means uncommon sequence of labor, and one which may lead to complete destruction of the joint, just as in the case of a metastatic infection of this joint from any other primary focus.

As an example of infection of the hip-joint following labor, I recall a case which occurred in my practice thirty years ago. The patient sent for me six weeks after parturition and stated that she had a chill during the labor, and that since the third day after labor she had suffered from intense pain in her hip: so intense was the pain that she screamed when any one approached the bed. Finally an abscess formed, pointed, and discharged itself, leaving as a legacy bony ankylosis of the joint. That, however, is an entirely different story from the one our patient of today presents.

Bursal infections form one of the most annoying types with which we have to deal. The commonest site of bursitis is the prepatellar bursa (*housemaid's knee*); next in frequency the olecranon bursa, then the subdeltoid bursa, which, when inflamed, proves most recalcitrant to treatment. It is not subdeltoid bursitis that forms the "glassarm" of baseball pitchers, but strain of the long head of the biceps. The bursitides of the lower extremity, however, fall prey to mixed infection sooner than those of the upper. At times buttons of cartilage and of bone project into the interior of these inflamed bursæ, as in the case of "Painful Exostosis of the Os Calcis," which was reported in Vol. IV, June, 1915, 505–526, Fig. 145, 2, p. 518.

When infected, the trochanteric bursa often attains a large size and sends out ramifications like the arms of an octopus (Fig. 168), which burrow into regional tissues just like a malignant tumor, but, of course, without giving rise to metastases. One of the most extensive dissections I have ever made in the lower extremity was in a case of trochanteric bursitis which had burrowed clear down to the knee. In the operative treatment nothing short of total removal of the bursal sac effects a cure: if any portion of the sac be left remaining, the bursa refills and continues to secrete and discharge through a sinus. The bursa is lined with mesothelial cells, which, in the presence of inflammation, assume the

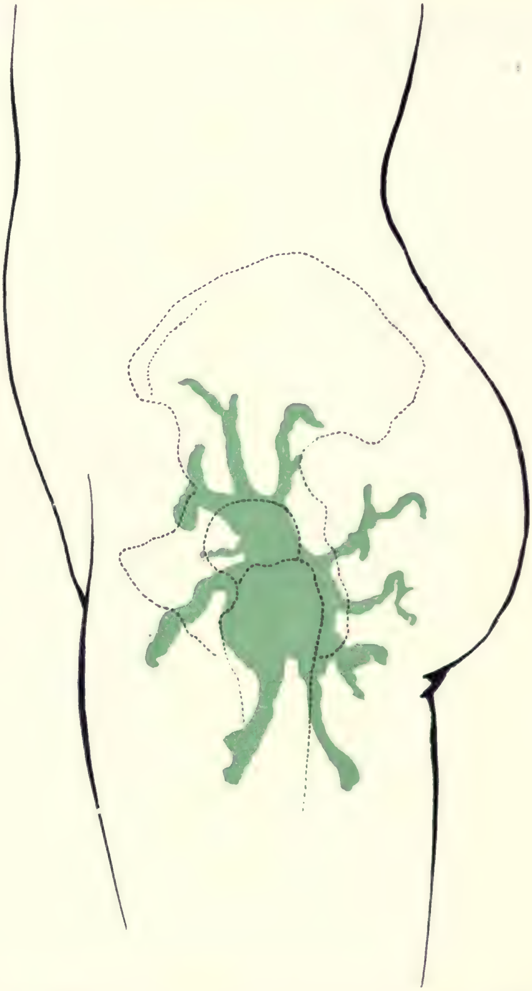

Fig. 168.—Trochanteric bursitis showing octopus-like ramifications.

character of epithelial cells and oversecrete under the stimulus of inflammation.

OPERATION

[A crucial incision was made, of which the vertical limb was ten inches in length and the horizontal, eight inches. Upon retraction of the four resulting flaps the trochanteric region and outer aspect of the thigh were fully exposed. The bursa, which was highly infected, had burrowed from the great trochanter clear up along the gluteus medius to near Poupart's ligament; downward along the anterior margin of the gluteus medius, and then through the gluteus maximus tendon close to its insertion into the gluteal ridge; forward to the point six inches below the trochanter, which had been marked in ink previous to operation; and, after forming a blanket which covered the entire trochanteric zone, it extended downward and burrowed below the lesser trochanter to the inner surface of the femur. Slowly dividing the fascia lata so as to preserve it intact, all the granulation-tissue and capsule were removed, and the whole bursa was cleaned out, and the upper end of the great trochanter, to which the bursa was attached and upon which there had been a deposit of cartilage and bone, was resected. The entire procedure was accomplished in such a manner as not to leave any of the granulation-tissue or cells lining the bursa in any portion of the thigh, so far as could be determined by a most careful and very extensive dissection. The wound was closed by accurately uniting the muscles, then the cut edges of the fascia lata, the superficial fascia, and the skin. Drainage was inserted at the upper angle of the wound.]

Pathologic Report.—The specimens consist of irregular pieces of tissue varying in size from two to six inches in length and containing sinuses which have been opened. Microscopic examination of tissue from the region of the sinuses reveals chronic inflammatory tissue with areas of necrosis. No evidence of tuberculosis was found in the many sections examined.

(The subject of trochanteric bursitis was fully discussed and illustrated in Vol. IV, June, 1915, 512–517; another case was presented in Vol. II, April, 1913, 337–344.)

BONE-INFECTIONS METASTATIC TO FURUNCLES (TWO CASES). CASE I.—PATHOLOGIC FRACTURE OF FEMUR FROM OSTEOMYELITIS—REDUCTION AND DOVETAILING OF FRAGMENTS. CASE II.—OSTEOMYELITIS OF ILIUM—TREATMENT BY AUTOSENSITIZED AUTOGENOUS VACCINE

Summary: Case I.—Clinical history of patient; comments—portal of entry and unfolding of the infection; time of metastases in relation to stage of primary infection—illustrations; nature of osteomyelitis when metastatic to furunculosis; osteomyelitis *vs.* "rheumatism"; pathogenesis of osteomyelitis and of invasion of a joint by continuity; plan of treatment and scope of operation; operation—reduction of deformity and dovetailing of fragments; postoperative comments—review of some technical points of the operation; review of course and events of patient's infection; clinical signs of acute osteomyelitis; the epiphysis as a barrier to infection of the joint in tuberculosis *vs.* osteomyelitis of suppurative type; value of sequestrum as a splint during the process of repair.

Case II.—Clinical history of patient; comments—interpretation of history and course of disease; treatment—conservative by vaccine.

CLINICAL HISTORY OF PATIENT

A MALE, twenty-two years of age, was admitted to Mercy Hospital November 15, 1914. The family and past histories are negative.

The patient complains of a rotation and annular deformity at the lower third of the left thigh, with a bony ankylosis of the knee. In February, 1913, while playing basketball, he suffered abrasions of both knees and legs: at the end of a week the abrasions were healed, but the patient noticed boils appearing upon both things—14 boils in all. He felt feverish, but had no chills. The femoral lymph-nodes became inflamed from the boils and remained swollen for one year.

On April 13, 1913, when the last two boils were almost healed, the patient fell while jumping over a creek, striking the left knee upon the ground. The next evening, while standing, he had extreme pain in the left thigh and noticed increased surface-heat. For the next two weeks he had fever of 101° F., but no noticeable chills: during this time he was treated by hot fomentations for "rheumatism."

Between April 13, 1913, and May 8, 1913, the patient noticed pain and swelling in several parts of the body, the pain being greatest in the right shoulder and left humerus.

On May 8, 1913, the patient's temperature reached 107° F., and his case was diagnosed as "general sepsis." In the evening he was submitted to operation: abscesses in the right shoulder and left thigh were opened and drained; from the thigh—which was very much distorted when incised—one full gallon of pus was evacuated; after operation the temperature fell to 100° F.

On May 9th an abscess in the middle of the left arm was opened.

On May 10th a gypsum case was applied to the left lower extremity, and windows were cut in it to provide for the outflow of discharge from the incisions. During the next three weeks there was purulent discharge from the nose.

On May 29th five drainage-tubes were "placed through the knee."

On May 30th, when the gypsum case was removed for change of dressing, a pathologic fracture of the femur at its middle was found: the upper fragment was abducted and the lower adducted.

During the succeeding months the operative wounds in the thigh alternately discharged, healed, and discharged again, and various spicules of bone were removed.

In December, 1913, a large sequestrum protruded as the swelling of the thigh subsided, and when the thigh reached its normal size, the sequestrum protruded one inch beyond the level of the skin in the lower third of the thigh.

In May, 1914, the lower third of the left femur was curetted, and a sequestrum six inches in length was removed: six weeks after operation the wound stopped discharging.

In August, 1914, the left thigh became swollen and red, and the patient felt feverish, but had no chill: he opened the abscess himself, whereupon the fever subsided, the wound closing four days later.

On November 11, 1914, the patient experienced *chill* for the first time and felt feverish: again the left thigh became inflamed; the abscess was opened and drained.

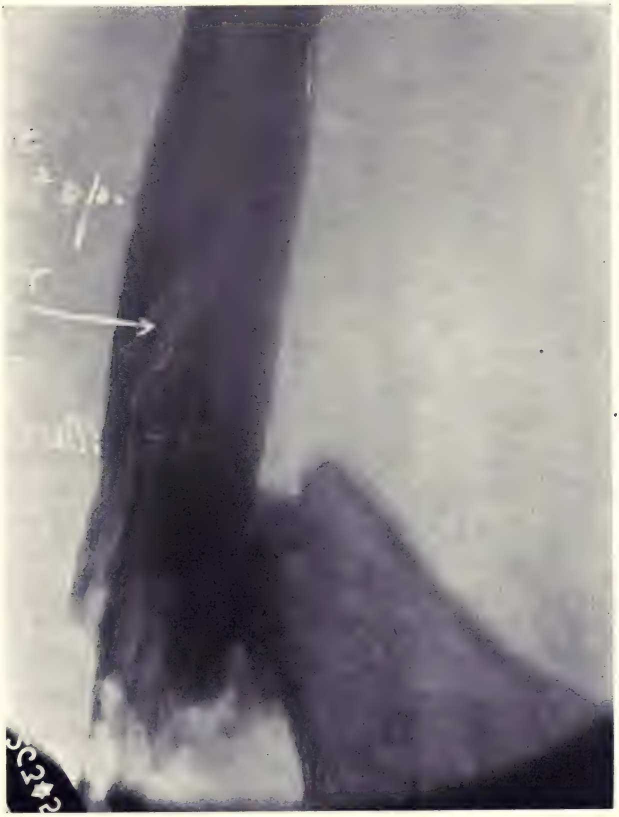

Fig. 169.—Pathologic fracture of femur the result of advanced osteomyelitis. Note shortening and backward sagging of fragments (November 15, 1914).

Examination the day of admission reveals marked shortening of the left lower limb, and an open operative wound of considerable length in the thigh, which was discharging pus in small quantity. Motion was free at the hip- and ankle-joints, but absent at the knee. Union had taken place in the pathologic fracture, but there was an angle rotation of the leg of about 80 degrees, so that the toe pointed in against the opposite leg. There were also an ankylosis and a great hypertrophy of the bone for almost the entire length of the shaft of the femur, both of which are shown in the skiagram (Fig. 169).

On November 16, 1914, the patient was submitted to operation: two abscesses—one before the femur and the other behind—were incised and drained. No necrotic bone was seen at the bottom of the wound. Lateral flaps were raised and placed across the field of operation, so as to close the anterior angle of the wound.

In December, 1914, the drainage-tubes were removed, and the wounds healed soon afterward.

On February 1, 1915, the thigh wound reopened and was drained: it closed up eight weeks later.

On May 12, 1915, the wound again reopened, but closed up a few weeks later.

Since May the patient has been quite well.

On September 9, 1915, the patient was readmitted to hospital with a view to getting the left thigh straightened.

COMMENTS

Dr. Murphy (December 22, 1915): The history is a classic example of the type of metastatic osteomyelitis infections which are secondary to furunculosis as a primary focus. Here the portals of entry for the furunculosis infection were abrasions of the knees received at basketball; and just at the time when the furuncles were practically healed—that is, at the last stage before complete repair, which is the time metastases take place in practically all except the streptococcic metastatic infections—the patient suffered the trauma.

It is a clinical observation that metastases never occur during the active stage of an infection, but at a definite period afterward. The why or wherefore of this periodicity is just as enigmatic as the explanation of the action of certain varieties of fish, which swim to only certain parts of a pond and constantly avoid other places. Such phenomena are in keeping with laws of the plant world and the animal kingdom, respectively. To mention a few illustrations, you never see a metastatic typhoidal abscess in the first week of typhoid fever; nor metastatic arthritis in the first week of a Neisserian infection of the male urethra; nor a metastatic infection in the first days of scarlatina; nor a metastatic infection in the first week of an influenzal attack: these metastases come when the disease is just passing away, and whether or not they are precipitated by trauma in every case we do not know, but this relation between the time of metastasis and the stage of the disease is a clinical observation— a classic clinical observation—to which we have been calling attention for fourteen years. So, too, metastases in various infections select very definite lodging points, so that Rosenow used the expression, "trained bacteria," from the fact that they go to definite places secondary from the definite primary infection. Ordinarily, the metastases from the upper air-passages take place most commonly into the shaft of long bones, the femur, tibia, and humerus being the commonest; still the short bones are not infrequently the sites of metastatic pus infections, though tuberculosis is a much commoner lesion in the short bones than pus infections. This should be clearly kept in mind by the doctors, because the diagnosis of tuberculosis is commonly made in all the small bone infections, as in the infections of the spinal column. Volkmann, in the Zeitschrift für Chirurgie, 1915, cites four cases of primary acute and subacute osteomyelitis of the spine. He was able to gather 83 from the literature. Staphylococcus aureus was isolated in 68 per cent. of the cases. While the original atrium could not always be distinguished, in about 25 per cent. there was a boil, felon, or carbuncle. As regards the location, the bodies of the vertebræ are involved in 34 per cent. of the cases, the arches in 58 per cent., and both in 7 per cent. Contrast this with tuberculosis. *The bodies are the only portions of the vertebræ which are primarily infected in tuberculosis.* The commonest site in the spine in which metastases occur is the lumbar region, 68 per cent. of the infections from acute manifestations while 18 per cent. were subacute. Only 33 per cent. were diagnosed correctly. The most frequent errors were: typhoid, 4; tuberculous spondylitis, 4; cerebrospinal meningitis, pneumonia, and rheumatism, each, 3. In 1896 the mortality was 71.4 per cent. according to Makins and Abbott, while in Volkmann's analysis of his present cases it was only 41.8 per cent., and this is reduced to 16 per cent. in the cases diagnosed and operated upon early. Involvement of the cord in the process of infection has been one of the commonest causes of the mortality in this region.

These osteomyelitis infections that occur from furunculosis result in a very wicked destruction of the bone, although they are not associated with quite so stormy symptoms as some of the metastatic bone infections due to other causes. As an instance of the furuncular type of bone infection, I recall one of the cases that came in eight or ten years ago, in our early arthroplasty work. The patient—a girl—had had a single boil on her arm. She was attending school, and in some way strained her knee. There followed a metastatic infection in the tibia, and she developed an osteomyelitis, pus from which burrowed beneath the periosteum and invaded her knee-joint, the infection terminating in both necrosis of the tibia and ankylosis of the knee. When she came to us we curetted her tibia, and the focus of osteomyelitis healed up; and later on we mobilized the joint by performing arthroplasty, and now one could not tell from seeing her walk which knee had been affected.

After the metastases have been launched, the rule is that these patients have fever and chill—that is, fever and chill during the time the septic emboli are circulating in the blood. In practically all bacterial infections we have the microörganisms circulating in the blood-stream continually: we can have Bacillus typhosus circulating in the blood-stream not only during the acute stage of the disease, but at times for weeks and months after the patient has recovered. In the early stages of typhoid fever it is not always possible to find the microörganisms in blood-cultures, but they seem to be liberated into the blood-stream before the process of repair is complete. An exception to this order of delayed metastatic infections occurs in that of the acute streptococcic type, in which the microörganisms are not held *in loco* and are not coffer-dammed.

In the patient upon whom we are going to operate today the metastatic infection lodged in the medulla of the femur just above the knee, whence it extended clear up through the medullary cavity into the neck of the bone. This attack of acute osteomyelitis was treated as "rheumatism," as practically all such cases are treated when the attending physician has not learned to differentiate between "rheumatism" and osteomyelitis: both these diseases present the same inaugural symptoms, but articular rheumatism always causes early effusion into the joint, while osteomyelitis may give rise to a *late*, but never an *early*, effusion into the joint.

The skiagram reveals a pathologic fracture of the femur below its middle, with backward sagging of the fragments: this sorry picture shows the terminal stage of the infection, and is the result of the pus having been retained so long under tension in the medullary cavity and then burrowing beneath the thickened periosteum, skirting the epiphysis beneath the perichondrium, and finally entering the joint-cavity itself. (See Vol. V, February, 1916, Fig. 28, p. 174.) Following the invasion of the joint, the knee was opened and drained, and the result was a perfectly good example of complete bony ankylosis from procrastination. No one wants to admit that he let out a *gallon* of pus if he has had charge of the case, for by so doing he furnishes a gallon of proof that the case was not properly managed: when, on the other hand, one lets out just a little pus, he does not say much either, because the case should have been opened early anyhow.

These osteomyelitis cases are just as typic and classic as, for example, cases of appendicitis, and just as easily diagnosed. These charts illustrate the rapidly devastating march of acute pyogenic osteomyelitis. (See Vol. V, February, 1916, Figs. 25–31, pp. 173–6). After the infection has continued for a certain period of time it burrows through the Haversian and nutrient canals to reach the surface of the bone, and then elevates the periosteum; so that with the nutrient circulation shut off from within by the tension of the accumulated products of infection in the medullary cavity, and from without by the elevation of the periosteum, What remains to nourish the bone? Nothing—a sequestrum forms. This is just a plain mechanical proposition, and one that is easily recognized, but as a profession we have not learned to act upon it, nor to open into the medulla just in the nick of time—within the first twenty-four hours. After making the incision through the soft parts, if there is edema just above the periosteum, you know that you are in the right place, and all you need do is drill a little hole in the bone, using in emergencies so common an instrument as your automobile gimlet. Do not worry about the sequestrum, for there will be no sequestrum if you open up during the early hours of the infection: be satisfied with merely taking off the pus tension.

This patient's symptoms of infection have not yet fully subsided: he has a continual leukocytosis, but we have waited until we feel that it is not prudent to wait any longer, lest his muscles should become unduly contracted.

On account of the deformity that followed the pathologic fracture there are six inches of apparent shortening. Owing to the probable presence of pus we are very much restricted in our choice of an agent for internal fixation of the fragments, for we can use neither metal nor a bone-graft; and for the same reason it is out of question to perform arthroplasty to mobilize the knee. Our main purpose today is to correct the deforming axial rotation and shortening of the limb, thereby restoring the patient's foot to its normal relationship with the ground and enabling him to walk.

OPERATION

[Through the incision made by the previous operator just to the inner side of Hunter's canal, an abscess was encountered, evacuated, and the cavity swabbed with 5 per cent. phenol. Working subperiosteally and with much caution, so as not to injure the vessels in Hunter's canal, the overlapping fragments were exposed and found firmly united. After separation of the bond of union the fragments were reduced with great difficulty, owing to the backward angulation. Cultures were taken from the pus. No foreign material, as nails or screws, were inserted. The bone-ends were dovetailed in such a manner as to prevent displacement of the fragments, but it was not necessary to remove so little as one inch in actual length. After closure of the wound the limb was immobilized in a gypsum case, which began at the roots of the toes and ended as a spica of the hip.]

POSTOPERATIVE COMMENTS

We were greatly hampered in our work by the presence of the pus: from the skiagram I had hoped that the abscess was entirely healed. We do not know whether or not this pus will prove sterile: it may be like that in a chronic pyosalpinx, which is sterile in 80 per cent. of cases.

When we removed the constrictor, you noticed how the blood welled up out of the wound and how rapidly the bleeding subsided. One advantage of removing the constrictor during the course of the operation and before it is concluded—which is the plan adopted by Mr. Lane—is that the bleeding becomes fairly well checked before one gets through with the work. The blood returned to the toes at once, showing that the circulation was excellent. The angular ankylosis of the knee with the dressing applied endangered the circulation, but this was unavoidable. Notwithstanding all the obstacles, we succeeded in performing the entire operation without hand-contacting.

There were six inches of apparent shortening, but since this was due to the angulation and overlapping of the fragments, there was but little actual shortening from destruction of a length of the shaft. There was an axial rotation of 80 degrees, so that in place of the toes pointing straight upward they pointed straight inward; we had to correct the rotation, overcome the shortening, and restore the bone to its full length, and all this had to be done, unfortunately, in the presence of pus, so that no internal fixation splint could be used to maintain the fragments when reduced.

Now let us review the course and events of the metastatic infection from the beginning. First, an infective embolus lodged in the nutrient vessel in the lower end of the femur, or in that in the upper end of the tibia—it amounts to the same thing, and we shall use the tibia as an illustration because the tibia is the better bone to teach with. The next step is the formation of pus in the medullary cavity, and when that occurs, fever and chills appear—and in a young child often delirium—and the patient is intensely sick. He will go to school in the morning and then come home with a chill and go to bed with a feeling of malaise and pains all over. He does not want to eat, and wakes up in the morning or in the middle of the night with intense pain in his limb, high fever, and at times delirium. Why has he the high fever, and why the delirium? Because there is an infective focus developing within the medulla—a rich vascular zone which is confined within a rigid wall of compact bone. This rigid wall cannot expand and the microörganisms keep on multiplying, with the result that the latter, having no other avenue of escape, are forced into the circulation, by which they are disseminated throughout the system in the blood-stream as bacterial emboli, giving rise to septicemia and other foci of infection as in the shoulder and arm in this case.

In the early stage of acute osteomyelitis there is no sensitiveness to superficial pressure, because the thick bony wall, which encloses the infective focus in the medulla, forms an impenetrable barrier to the palpating finger. With a felon it is otherwise: an impress can be made upon a felon because it is merely a superficial accumulation of pus beneath the periosteum. While an impress cannot be made upon the intramedullary infection by superficial palpation, yet if pressure with the finger-tips be maintained for from twenty to thirty seconds the pain becomes intolerable, because of the edema and sensitiveness of the periosteum: this point of localized tenderness indicates the location of the intramedullary focus of pus.

Acute intramedullary infection, when unrelieved by surgical measures, spreads like wildfire: at the end of twelve hours there is quite an abscess within the soft tissue of the medulla, and the pus spreads rapidly through this soft, vascular tissue until it has extended along the entire length of the bone: the nutrient vessels and those in the Haversian canals are destroyed, and necrosis of the shaft begins. By the end of forty-eight hours after the onset the pus has burrowed to the surface, forming a subperiosteal abscess. What further indications for trepanning the bone does one need beside pain, high fever, sensitiveness to maintained pressure, and the knowledge of the highly destructive effects of infective pus under tension in the vascular medulla, and so confined by the thick wall of compact bone that it cannot escape quickly?

As soon as the pus, by burrowing, reaches the surface of the bone, there is just enough release of tension to cause a temporary decline of the fever, and then the patient feels somewhat better. Soon, however, there is a rapid accumulation of pus beneath the periosteum, and the bone undergoes necrosis, for the reasons already referred to. The joint itself is protected by the epiphyseal line, which, being cartilaginous in children, forms an impenetrable barrier to the advance of pus into the joint. By passing beneath the periosteum tangentially to the epiphysis, however, the pus enters the joint from the side, and by the same token differs wholly from the manner in which osseous tuberculosis enters the joint. Tuberculosis begins in the epiphysis, and not in the shaft of the bone (except in rare instances, as in the bovine type described by Stiles, of Edinburgh), and therefore it begins on the *joint* side of the epiphyseal cartilage and enters the joint directly, without having to circumvent the latter. Osteomyelitis, on the other hand, is always a metaphyseal lesion, and begins on the *shaft* side of the epiphyseal cartilage.

And so this patient's knee-joint was destroyed and ankylosed. You can see how very important it is that early action be taken in this class of cases, for the maximum of bone destruction is attained in seventy-two hours, and in an enormous percentage of cases in forty-eight hours. Therefore, if you do not trepan the bone within forty-eight hours, you are not much more than an expensive ornament around that case. The same urgency holds true in regard to gangrenous appendicitis: gangrenous appendices are practically all gangrenous and many perforated inside of thirty-eight hours.

Postscript (*April 5, 1916*).—It is now over three months since the operation was performed: there is good union, and the femur is straight. No infection immediately followed the operation, but three weeks afterward discharge made its appearance from a small sinus, and examination revealed the presence of a sequestrum, which elevated the periosteum and was surrounded by very dense subperiosteal callus. This sequestrum answered a splendid purpose, in that it maintained the conformation of the limb during the formation of the periosteal callus. (All palpable sequestra were removed today.)

CASE II

A MALE, four years of age, was admitted to Mercy Hospital November 6, 1915. The family history reveals that the patient's maternal grandmother died from tuberculosis.

On or about August 20, 1915, while running about barefooted, the patient stepped on a pitchfork, scratching the left foot just behind the great toe: his mother put on a poultice, and in two or three days the scratch was healed up.

On August 27th the parents noticed an abscess on the child's left thigh, close to the gluteal fold: this abscess was lanced by a physician the same day. For the next two days the patient was languid, did not eat, and complained of headache.

On August 29th there was fever of 103.6° F., and the patient was ordered to bed by the physician: the child was restless, continually changed his position in bed, and could not sleep. The next day his temperature was 104.6° F., and the physician thought that he might have meningitis.

On or about September 3d two boils appeared on the nape of the neck, two at the tip of the coccyx, and one on the inner side of each knee. The patient's temperature remained between 101° and 102° F. The boils healed within three or four days, and left neither swelling nor redness. During the febrile period the patient had no desire to eat, but since then his appetite has been very good.

It was not long before both feet, ankles, knees, elbows, the lumbar region of the back, and the right hip became swollen, red, and stiff. Since September 15th the patient has had pain in the right hip and in the left elbow and left wrist: the right hip has been the most painful, especially at night.

Since October 1st the patient has held the right hip in a flexed position, and the physician made no attempt to straighten it because of the pain: this hip is still swollen and tender to touch.

On October 10th the left elbow and wrist were found to be swollen, and for nearly three weeks the patient complained of pain in the left arm and kept the elbow flexed: for the last three weeks, however, he has been using the left arm, but it is still swollen from elbow to wrist. The pain in the other joints has subsided.

COMMENTS

Dr. Murphy (December 17, 1915): What is the matter with the patient? He received his primary infection when he stepped on the fork; from this a secondary infection in the skin resulted, and then suddenly there developed fever,—which was higher than that which ordinarily accompanies furunculosis,—after which the right leg became painful, and he was unable to move it on account of the pain. The original skiagram shows the absence of the head of the femur from the acetabulum and its presence on the dorsum of the ilium. The limb itself is contractured in the adducted position—a common sequel of metastatic infection of the hip-joint when neglected. The most striking instances of this deformity occur in metastatic arthritis of the hip-joint associated with scarlatina and typhoid fever: in both cases the joint-capsule becomes inflamed, swollen, and softened, and when the adductor muscles contract from reflex action, the head of the femur mounts upon the rim of the acetabulum, bursts through the softened capsule, and slips over upon the dorsum of the ilium, just as in this case.

In this patient's case the whole story is told by the skiagram. It is apparent that the ilium has lost all its compact structure: it is porous throughout, and the constant pressure to which it has been subjected in its softened state has resulted in sinking-in of the acetabulum. The ischium, on the other hand, shows up as compact tissue. The patient also suffered from metastatic osteomyelitis in the lower end of the radius, which was accompanied by high fever: on incising this focus we obtained pus which revealed the staphylococcic type of the infection. How are we handling the metastatic focus in the ilium? Not by opening and draining it, lest he should get a more serious infection than the staphylococcic already present. In order to prevent crippling we are maintaining the limb in the position of extension with abduction, until a strong involucrum has had time to develop: in the meantime we are neutralizing the infection itself with autosensitized autovaccines, so as to prevent additional metastatic infections in other parts. When the ilium has become entirely surrounded by new bone, the abscess-cavity may be opened if absorption has not already been produced by the vaccines.

The whole infection followed the neglect of that little pitchfork wound in the foot: consequent upon this, secondary furunculosis appeared, but the furuncles were not opened and drained as they should have been, and the microörganisms passed into the blood-stream and were carried as bacterial emboli to the ilium, in which they lodged and gave rise to metastatic infective osteomyelitis. This lesion of the ilium might have killed the patient, or at least have made him a permanent cripple, and all because the original wound was not cared for—a striking example of the importance of caring for the little things.

Postscript.—The last report from the patient some weeks ago was very favorable. He is continuing the treatment at home.

TRAUMATIC INTRAMUSCULAR OSSIFICATION (VASTUS INTERNUS)—ABLATION OF OSSIFIC TISSUE

Summary: Clinical history of patient; comments—discussion of the differential diagnosis; pathology—laceration with elevation of periosteum, outpouring of blood beneath periosteum, fibrous degeneration of clot, ossification of fibrous tissue; operation—ablation of ossific tissue. Talk on traumatic intramuscular ossification.

CLINICAL HISTORY OF PATIENT

A MALE, eighteen years of age, was admitted to Mercy Hospital January 21, 1916. The family and past histories are negative.

The patient complains of a growth in the right thigh. On March 19, 1915, while playing basketball, the patient was struck upon the anterior portion of the thigh at about its middle. He paid no attention to the injury, but on resuming play the next evening he experienced severe pain in the thigh, but continued at the game. The next day he was up and about, and for several days the thigh was sore, but he was not inconvenienced much for about two weeks. Examination of the thigh revealed no black and blue area, nor any tumor that the patient was able to see.

Two weeks after the receipt of the first injury the patient was again struck upon the thigh: while the latter remained sore for several days, yet at the end of that time the patient was able to be up and about and walk fairly well, though with some pain.

On April 12, 1915, the third injury was received when the patient slipped on the ice and twisted the right knee, and was followed by considerable pain and swelling, which confined the patient to bed for almost a week; after the rest in bed he felt greatly relieved, and at present is able to get about.

Examination by Dr. Murphy (April 19, 1915).—There is a large mass in the middle of the thigh in front, which possesses a certain danger of undergoing sarcomatous degeneration. There is also effusion in the knee-joint, from which bloody serum was aspirated: microscopic examination of the fluid showed numerous erythrocytes and leukocytes, but neither bacteria nor pus. The aspiration was made at a site four inches above the patella, and the tension of the knee-joint was much diminished after withdrawal of the fluid. Skiagram reveals an area of ossification in the vastus internus muscle of the thigh (Fig. 170).

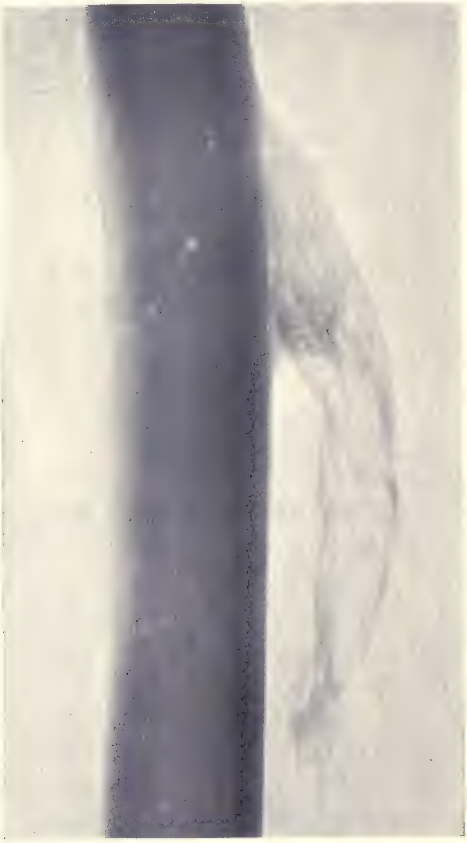

Fig. 170.—Traumatic intramuscular ossification in vastus internus. Note bony horn growing from sessile base.

COMMENTS

Dr. Murphy (January 24, 1916): There are two conditions that may give rise to the irregular bony mass which the skiagram reveals: one is detachment with elevation of the periosteum from the bone, as occurs in muscular strain and in contusion of the periosteum with muscle-laceration (*traumatic intramuscular ossification*); the other is sarcoma. In the former condition—where muscular attachments pull off the periosteum—a hematoma forms beneath the periosteum and, according to rule, osteogenesis takes place and converts the hematoma into a mass of bone. This surgical maxim is put to practical use in the operative treatment of ununited fractures by elevating the periosteum for an inch above and below the line of fracture so as to permit a hematoma to form beneath the periosteum and become ossified; or by inserting bone-chips beneath the periosteum, in order to stimulate osteogenesis—a method originated by Dr. Murphy. So, too, during the growth of subperiosteal sarcoma the periosteum is elevated from the bone, and ossification takes place beneath it, forming the pathologic type known as "ossifying periosteal sarcoma." But so clean-cut and compact is the area of ossification demonstrated by the skiagram that we interpret the lesion as being due to subperiosteal bone-formation the sequence of trauma,—not of sarcoma,—and resembling a traumatic myositis ossificans. While the patient was under our observation, we put him upon therapeutic doses of *x*-rays and hypodermic injections of sodium cacodylate: the bony deposit has become more and more compact.

OPERATION

[The lesion was exposed through an intermuscular incision to the outer side of the femoral vessels, exposing the vastus internus. It was found that the periosteum had been torn off and elevated, and that ossification had taken place and extended into the vastus internus muscle. The bony mass with its periosteum was freed from soft tissue, separated at its base, and removed—that is, the periosteum was retained on the bone that was removed. Unless the periosteum is removed with the new bone, it is liable to become recurrent. After checking venous oozing the wound was closed without drainage.]

TALK ON TRAUMATIC INTRAMUSCULAR OSSIFICATION

A somewhat similar case was admitted to the Ancoats Hospital, Manchester, and was reported by Morley in an excellent article on the subject in the *British Medical Journal* for December 6, 1913, 1475. It concerned a male, twenty years of age, a greengrocer's assistant, who, three weeks before admission, was run over by a wagon, the wheel passing over the front of the left thigh. At first he noticed nothing wrong, but shortly afterward, on bending the knee, felt a sudden pain in the lower third of the thigh, and this was followed almost immediately by swelling, which became considerable. The skiagrapher reported a "faint subperiosteal deposit of bone, irregular in shape, that might be due to a periosteal sarcoma." At operation a large hematoma was evacuated lying under and in the crureus muscle. At the bottom of the cavity the femur was covered by a layer of new bone, which averaged 2 cm. in thickness, and from it blunt spikes and bars projected irregularly into the muscle and the cavity of the hematoma. The new bone was soft, and presented exactly the appearance of three-weeks'-old callus. The mass, together with the periosteum, was removed with the gouge. *Within three weeks a definite recurrence, much larger than the original growth, took place.*

Before discussing the subject more in detail it is just as well to emphasize the two salient points about traumatic intramuscular ossification. The first is, *be sure you are not dealing with periosteal sarcoma;* and the second, *do not operate unless disability exists, and then do not be satisfied with simple excision, for recurrence usually ensues.* Concluding that the cause of the recurrence was the destruction of periosteum and loss of its function as a limiting membrane for the osteoblasts, Morley decided to remove the recurrent bone and transplant a piece of iliotibial band onto the denuded femur, to fulfil the double function of preventing recurrence and preventing adhesions of muscle to the denuded bone. This plan was carried out with complete success, function being restored and skiagrams taken four and eight weeks after operation, showing entire freedom from recurrence. This is not a sufficiently long time to justify the conclusion that it will not return.

As to the second point, the danger of mistaking traumatic intramuscular ossification for periosteal sarcoma is a very real one, and doubtless many limbs have been unnecessarily sacrificed by not recognizing the benign nature of the malady; and, conversely, many lives have been sacrificed by assuming that the lesion is a subperiosteal osteitis or a subperiosteal ossification when the true lesion is a sarcoma. If sarcoma is once curetted and the limb not amputated, the opportunity for saving life is practically lost, as metastases occur. Both lesions may arise after trauma, immediately or following an interval. According to Bloodgood, if the intramuscular ossification be seen early, before bone forms, it cannot be differentiated positively from sarcoma, except at the time of the exploratory incision, and with a frozen section, which should be made before amputation or excision is proceeded with; and in cases in which the bone formation in the muscle extends to the shaft of the neighboring bones it may be difficult, even with the aid of a skiagram, to differentiate the lesion from periosteal osteosarcoma (*Progressive Medicine*, 1913, iv, 259). As to the question of the possibility of sarcomatous degeneration of an area of intramuscular ossification, probably the only case in literature is that reported by Coley (*Annals of Surgery*, 1913, lvii, 305—with bibliography). This had to do with a female, twenty-six years of age, who, eight years previously, suffered a contusion of the lower part of the thigh. Two years later an exostosis was found, and three years after this Coley explored and proved by histologic examination that there was no sarcoma, and the diagnosis of intramuscular ossification was confirmed. Three years later the patient began to suffer pain, and exploratory operation with histologic examination showed what was diagnosed giant-cell sarcoma, but what Bloodgood, in commenting upon the case, regarded as a very malignant mixed-cell sarcoma containing giant-cells. The patient died, with symptoms of metastasis, about eight months after amputation.

Traumatic intramuscular ossification is the term suggested by Morley in lieu of the old term of myositis ossificans traumatica —a name that is objectionable as implying a theory of its pathology for which, he shows, there is little foundation. He states that this condition follows the infliction of a single severe contusion, and must be distinguished clearly from two other types of intramuscular ossification, namely: (1) Myositis ossificans progressiva, which starts early in life, usually in the muscles of the back, and ultimately causes death from respiratory failure; and (2) ossification into tendons, the result of slight, repeated mechanical irritation, such as "rider's bone."

The locations in which traumatic intramuscular ossification is liable to develop are both remarkable and interesting. Thus, Schultz, quoted by Makins (*Proc. Roy. Soc. Med.*, 1910–11, iv, 134), collected from the records of the German army in ten years 233 cases, of which *all but three were situated in the quadriceps femoris or brachialis muscles*. In certain recorded cases almost the entire muscle has been infiltrated with bony deposit. Most of the patients are young adult or adolescent males who have been exposed to a severe subcutaneous contusion—usually a kick on the front of the thigh or a blow with a fist on the front of the upper arm. In both these situations there is a broad, smooth, convex area of bone, covered by periosteum that is loosely attached and readily stripped off, owing to the absence of tendinous insertions. This contrasts with the specimen which we have here today, because in this there is a definite bony horn growing from a sessile base (Fig. 170). In the light of these facts and of his own investigations, Morley considers the pathology of traumatic intramuscular ossification to be as follows: A severe blunt injury at once subcutaneously strips off and destroys the periosteum and crushes the muscles in contact with the bone. Bleeding occurs from the surface of the denuded bone, and, with the blood, osteoblasts in a free and possibly ameboid condition escape into the pulped muscle-tissue and blood and therein produce a growth of bone. As Macewen has shown, healthy muscles left in contact with denuded bone form protective fibrous adhesions from their interstitial connective tissue, and so take on the limiting function of the periosteum. But *severely contused* muscle tissue mixed with blood, so far from restraining the migration and growth of osteoblasts, provides a very favorable pabulum for them, as Dr. Murphy has accentuated so frequently in connection with fractures in the neighborhood of joints in children, where the periosteum is torn off and where ossific deposits take place which subsequently materially limit the motion of the joint. He accentuates the ease with which the periosteum is torn off in children and the resistance which it offers in adults.

As to prognosis without operation, growth usually ceases after a number of months, and reabsorption to a certain extent occurs. Disability, due to interference with locomotion, may ultimately give way under exercise to perfect restoration of function, although it may be a matter of months or of years.

Shere collected 200 cases of traumatic intramuscular ossification, and accentuated the treatment, namely, by an open operation to drain the hematoma mentioned above. In this we do not concur. Outland and Clendening, in 1915, reported a recurrent myositis ossificans resulting from a blow on the left thigh. The quadriceps extensor was the site of the ossification, which measured 10 x 3 x 2 inches. There was much infiltration and edema beyond the line of ossific conformation. It was believed to be due to an injury received while playing football.

Postscript.—The wound healed *per primam*, and the patient was discharged from hospital on February 15, 1916.

ADDENDUM *IN RE* VILLOUS SYNOVITIS

Addendum (*July 5, 1916*).—Many readers of the CLINICS will be interested in the note received today from the patient upon whom synovial capsulectomy was performed for hypertrophic villous synovitis of the knee-joint, and whose case was reported, together with illustrations, in Vol. V, February, 1916, 155–64.

We shall reprint the postscript of October 16, 1915—four months after operation: "I have been up and about for two months, having regained 30 degrees of motion in my knee-joint, and am now able to get around without crutches."

The patient now writes—one year after operation: "I am having no more trouble with that knee and am well pleased with the results, but am having a very similar trouble with the other knee and would like to have it operated upon."

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Volume V JOHN B. MURPHY Number 5

TALK ON VARICOSE VEINS AND VARICOSE LEG ULCERS

VARICOSE veins and varicose leg ulcers seem, at first glance, like old and hackneyed subjects; but, granted that they are, still they form a large percentage of one's practice, and the mere fact that so much is constantly being written and said about them goes to show that there are many knotty problems—chiefly therapeutic—which remain to be solved: any light, therefore, which has recently been shed upon these problems should not be permitted to remain hidden beneath the proverbial bushel basket. Thus, Smits (*Annals of Surgery*, May, 1916, 576) says: "Every endeavor to treat the despair of all hospitals—the chronic varicose ulcer—with more chance of success must be welcomed with joy. . . . Indeed, the extensive, nearly endless, literature on chronic ulcers of the leg, the laudatory commendations of continually renewed remedies, prove beyond doubt that a passion for using powders and ointments puts us off the track. A specific remedy will never be found, though one drug may have an apparent advantage over another; the manufacturers derive the most profit from it, the patients the least."

I. VARICOSE VEINS

Summarizing the principal physiologic and anatomic features of the venous circulation in the legs, Homans (*Surg., Gynec. and Obst.*, February, 1916, 143–158) writes: "The veins pass the blood upward through a series of chambers separated by bicuspid valves set to permit only an upward flow; this flow is favored by movements of the leg muscles assisted by the forces in the thorax which tend to empty the vena cava, and by the push of the capillary circulation; the walls of the veins must support a column of blood whose height is measured by the distance to the heart above, and inasmuch as the abdominal veins are valveless, the pressure upon the upper valve, or upon the vessel-walls below it if this valve becomes incompetent, may be enormously heightened by increase in intra-abdominal tension; the deep veins of the legs have a strong muscular support outside their own walls, while the surface veins derive an adventitious support only from the superficial fat and skin; a system of vessels perforating the deep fascia communicates between the two, and, owing to the arrangement of its valves, lightens to some extent the work of the latter (Figs. 171–174)."

In the conclusions to this paper, which is entitled "The Operative Treatment of Varicose Veins and Ulcers, Based Upon a Classification of These Lesions," Homans states: "Varicosity of the veins of the legs is confined for anatomic and physiologic reasons to the superficial and perforating vessels.

"Trendelenburg's tests distinguish between pure surface varix and surface varix complicated by varicosity of the perforating veins, a distinction important for purposes of treatment.

"Surface varix is curable by relatively simple surgical procedures, preferably excision of the great saphenous vein from groin to mid-calf.

"Surface varix complicated by varicosity of the perforating veins requires for its cure not only eradication of the great saphenous vein, but a thorough exploration of the lower leg in order to ligate varicose perforating veins.

"Varix following phlebitis is not uncommon, presents a characteristic appearance, is prone to be complicated by varicosity of the perforating veins, and is usually accompanied by obstinate ulceration soon after its establishment.

"It is a very general rule, if not a law, that the more prominent and tortuous the surface veins, the simpler the cure; the less noticeable the surface veins, the more malignant and resistant their attendant ulcers and the more radical the operative procedure required for cure.

"Varicose ulcers, if of long standing and especially if they are surrounded by an area of thick scar-tissue, are best treated by free excision and immediate skin-graft in connection with the radical removal of the veins to which they are tributary."

For all practical purposes a varicose vein in the lower extremities may be described as merely a valveless vein, or, more properly, a vein whose valves are incompetent. The most obvious cause of the breaking down of the valves, according to Homans, is hard work, such as carrying or lifting heavy loads for long periods, as in the case of longshoremen, freight-handlers, and laborers. The tension upon the abdominal muscles, the downward push of the diaphragm in violent breathing—in fact, the same strain which produces hernia lays a heavy load upon the veins of the legs. The occupations which involve standing for long periods without moving the legs are, in a lesser degree, a source of valvular incompetence, and this not from excessive back pressure, but from stasis due to lack of muscular movement. In young men, and in young women who have never borne children, one sees instances of varix which date from childhood, apparently due to congenital abnormalities. The second and less common variety of varicose veins arises from phlebitis.

The tests for valvular incompetence of the surface veins as opposed to hypertrophy or distention of normal vessels, which were devised by Trendelenburg (*Beitr. z. klin. Chir.*, 1890, vii, 195), are easily performed. The leg is raised and held above the level of the heart until the veins are empty; it is then rapidly lowered, whereupon the blood can be seen to flow back into the leg and suddenly distend the surface vessels. To determine the presence of varicosity of the perforating veins, in addition to that of the surface veins, the *contre-épreuve* or constriction test is available. After raising the limb to empty the veins of blood a constrictor is adjusted to the upper thigh just firm enough to compress the surface vessels: if the perforating veins are incompetent, the surface vessels below the constrictor will fill more rapidly—in ten, twenty, or thirty seconds; whereas if the surface veins alone are varicose, filling below the constriction takes place in forty-five seconds or more and even then these vessels may not be very tense, for the competent perforating veins continually carry off the excess of blood. These tests ignore the presence of varix of the deep venous system—a condition that is present, according to Gay, Quénu, and others, in about one-half of the cases, al-

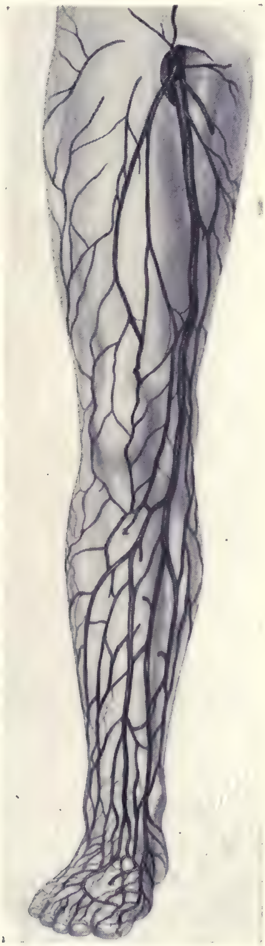

Fig. 171.

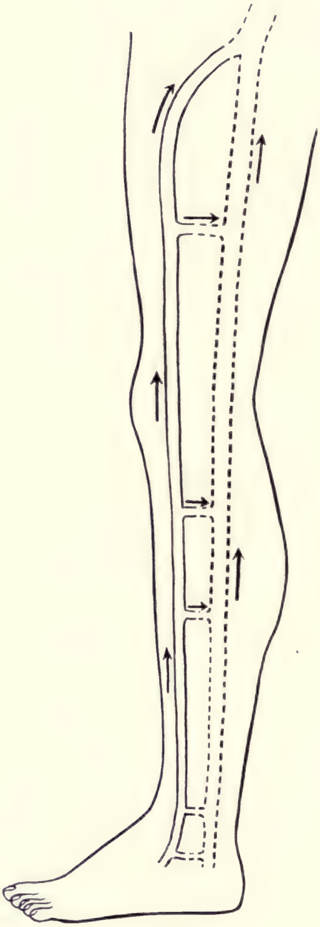

Fig. 172.

Fig. 171.—The superficial veins. The great saphenous and its branches. Notice the region of the perforating vessels (Homans).

Fig. 172.—Diagram showing normal direction of blood-current in the superficial and deep systems. Notice directions of current in the perforating vessels (Homans).

though not infrequently it occurs with but little evidence of disease in the superficial group. Where the deeper veins are involved, however, pain and discomfort are, as a rule, more marked

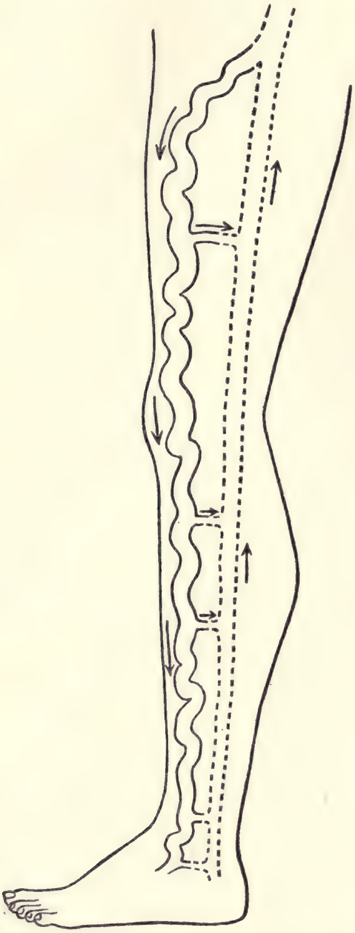

Fig. 173.

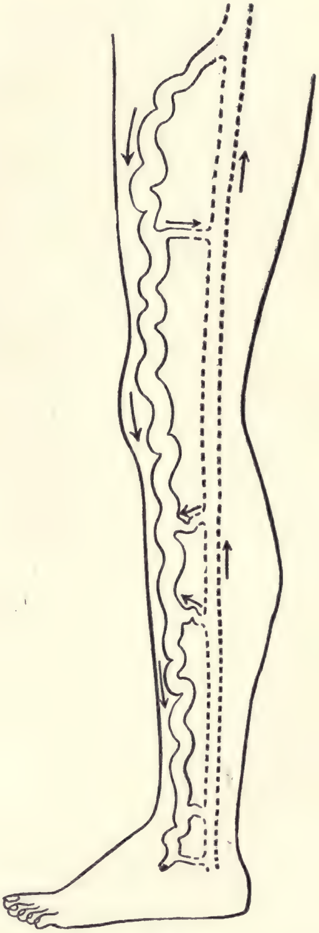

Fig. 174.

Fig. 173.—Diagram showing direction of blood-current in superficial varix with normal perforating vessels. The perforating veins drain the surface vessels (Homans).

Fig. 174.—Diagram showing direction of blood-current in superficial varix with incompetent perforating vessels. The perforating veins add to the disability of the surface vessels (Homans).

than in the superficial variety. In these cases there is often more edema on standing, and the visible dilatations are more marked at the points where the deep anastomosing veins join the superficial system. It may be stated as a law that the less noticeable the veins, the more malignant and resistant the accompanying ulcers, and the more radical and thorough must be the curative operation: this is the *paradoxic law of varicose veins* (Homans).

The chief complications of varicose veins of the leg are thrombophlebitis, with its attendant danger of embolism, and hemorrhage from rupture of a thin-walled vein through the greatly thinned-out and ulcerated overlying skin. The former complication is rare, and is not liable to occur if the thrombosed vein is handled gently and not subjected to trauma (*vide infra*, p. 970). Hemorrhage from rupture by its sudden onset is so alarming as to constitute a household catastrophe. The methods of stanching the flow of blood, however, are simple, and should be inculcated in all "first-aid" teachings. With the patient on her back, the limb is elevated to the vertical and a firm compress is applied to the bleeding site. After healing has taken place the patient should be subjected to operation for removal of the veins if indicated, or proper supportive agents for the lax and thin-walled veins should be applied to the leg.

By way of anomalies, the long saphenous vein may be limited to the thigh, or it may be double. Exceptionally varicosities involve the short saphenous vein and its branches, less frequently alone, and more frequently accompanying varix of the long saphenous vein.

Of the operative procedures for varicose veins the least radical is that which was proposed by Trendelenburg, in 1890 (*loc. supra cit.*). The original method was merely to ligate the long saphenous in the thigh, so as to relieve the veins below by breaking the long column of blood from the right heart. In the later modification an Esmarch bandage is applied to the entire limb, and then a small section of the long saphenous vein close to the saphenous opening is resected between two ligatures. This method is of value when the disease is limited to the long saphenous vein and its tributaries, provided the perforating veins are proved to be competent, and in the early stages before the walls of the dilated veins have become permanently thickened. It is indicated in the aged and infirm, and to heal an ulcer temporarily. Miller (*Johns Hop. Hosp. Bull.*, 1906, xvii, 289) found after Trendelenburg's operation an anatomic recurrence after five years in from 60 to 70 per cent. of the cases, but with symptomatic recurrence in only from 20 to 30 per cent. The earlier figures published by Stein in his dissertation (Bostock, 1902) showed that 50 per cent. of the cases treated by this method were cured. Homans accounts for these recurrences through the re-establishment of the channel of the vein by the aid of collateral circulation or by the formation of new veins in the scar-tissue separating the ends of the divided segments.

Multiple ligation of the main trunk of the long saphenous was described by Schwartz (*Rev. gén. de clin. et de therap.*, 1888, ii, 65), the purpose being to divide the channel into a number of isolated segments in which the blood soon organizes and obliterates the lumen. Multiple ligation by the percutaneous method, the technic of which was devised by Schede (*Berl. klin. Wchnschr.*, 1877, xiv, 85) and modified by Kuzmik (*Beitr. z. klin. Chir.*, 1913, lxxxiv, 1), was applied in 155 cases by Secher (*Hospitalstidende*, April, 1915): under general anesthesia a silk suture (Kuzmik) or catgut (Schede) is passed around the vein, but without exposing the latter, and this is repeated at intervals of 2 cm. (Schede) or 5 cm. (Kuzmik): while convalescence is rapid because no incisions are made, yet the method is applicable to favorable cases alone.

Partial resection of the principal trunks of the dilated veins is indicated in a large number of cases: an incision should be made over the highest point of the diseased vessel, the vein isolated, doubly ligated, and a small section removed; incision should then be made over the most prominent masses lower down, the vessel resected, the various branches and free extremities of the vein ligated, and the skin wound united ("*Résections etagées*" of Cassatti and others).

Total open excision of the long saphenous vein, according to the method of Madelung (*Verhandl. d. deutsch. Gesellsch. f. Chir.*, 1884, xiii, 114)—the most radical method—remains for difficult cases of the common surface varix without the involvement of the perforating vessels: this operation is founded on sound principles and gives as much as may be attained by any method of extirpation, cure resulting, according to Stein (*loc. supra cit.*), in 80 per cent. of the cases treated by Madelung's method. The long incisions required, however, afford greater opportunity of wound-infection, and when the leg is edematous, indurated, and covered with ulcers, the necessary retraction of skin-flaps is rendered difficult and even impossible: in such a condition of the leg below the knee the multiple spiral incisions of Rindfleisch (1907) may be used with advantage, the wounds being packed to obtain deep scars. The varicose perforating vessels may be dealt with by being picked up and tied one by one, after the method of Novaro (*Beitr. z. klin. Chir.*, 1910, lxxi, 420).

Injection-operations for varicose veins defy general pathologic principles and cannot be indorsed: such a procedure is that of Tavel (*Deutsch. Zeitschr. f. Chirurg.*, Bd. 109, earlier published by him in *Correspondenzbl. f. schweiz. Aerzte*), who ties the long saphenous vein and resects—quite near the femoral vein—a piece five centimeters long. One or two days after the operation he injects, every two or three days, a dose of 10 c.c. of an aqueous solution of phenol into the tortuous vein, if possible into the lumen of the vessels. In this way an artificial thrombus is formed, as also by injections external to the veins; these, however, are more painful and may cause gangrene of the covering layers of the skin. According to Smits, by the formation of a thrombus danger always threatens, as Kocher saw after an operation by which he removed parts of varicose tumors in the calf and performed high ligation of the long saphenous vein: getting up from bed, the patient suddenly died from an embolus of the pulmonary artery. This case proves that a ligature of the long saphenous vein is unable to prevent a thrombus formed in the veins of the leg from being carried to any distant vessel and obstructing the circulation there.

The subcutaneous method, as advocated by Mamourian (for results consult paper by Orloff, in *Virchow-Hirsch Jahresbericht* for 1913) and by Mayo (*Surg., Gynec. and Obst.*, 1906, ii, 385), is contraindicated in inflammations, thrombosis, strong cicatrizations, calcareous deposits, and weak and thin coats of veins with sacculations, which complications exist in about 10 per cent. of the cases (Fig. 175—from Keen's "Surgery," Vol. V, p. 162, Fig. 63).

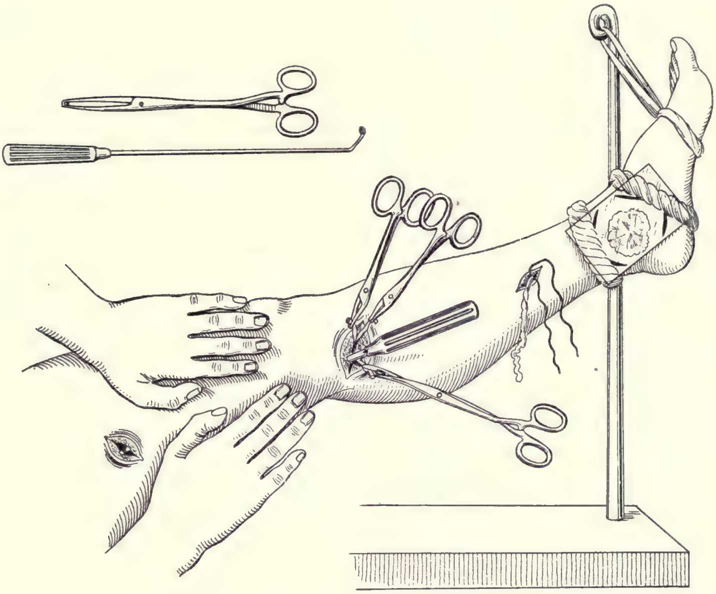

Fig. 175.—Charles H. Mayo's subcutaneous method of extirpating varicose veins (Keen's "Surgery").

In advocating nerve-stretching for perforating and varicose ulcers of the leg Smits (*loc. supra cit.*) believes that this procedure may also obviate the necessity for operations upon veins which have not become too much dilated, and that it has a restorative influence on the varix itself: he has likewise performed the operation of *laceration of the nerve* in several cases of large painful varix; in these cases he has noted that not only did the pain cease, but the dilated veins diminished in volume. With Chipault he believes in a trophic influence on the coats of the varicose vessels, but he also believes in the more intensive action of *lacerating* the nerve-trunk. He has performed this operation many times and never with any harmful result, but always with notable effect.

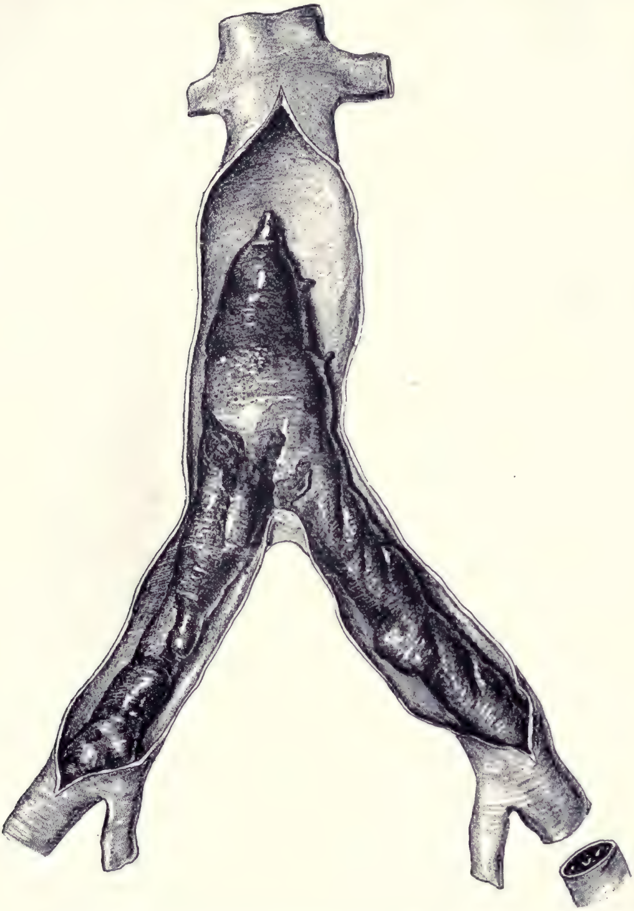

Fig. 176.—Thrombus in vena cava inferior and iliac veins (modified from MacCallum).

True varicose veins must be differentiated from compensatory enlargement of the surface veins of the lower extremity, abdomen, and thorax due to thrombophlebitis of one of the external or common iliac veins, and, when both sides of the body are involved, to occlusion of the vena cava inferior (Figs. 176, 177, 178), for operative obliteration of the veins under these circumstances

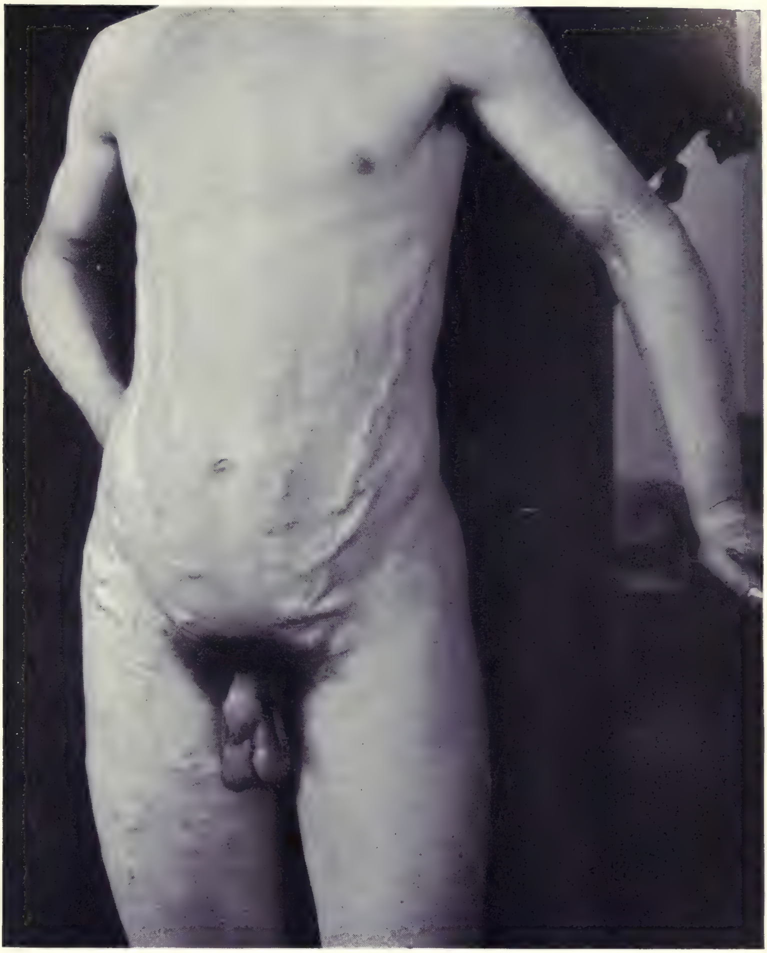

Fig. 177.—Enlargement of superficial veins consequent upon occlusion of the vena cava inferior (P. G. Skillern, Jr., in *Annals of Surgery*, June, 1913, 916).

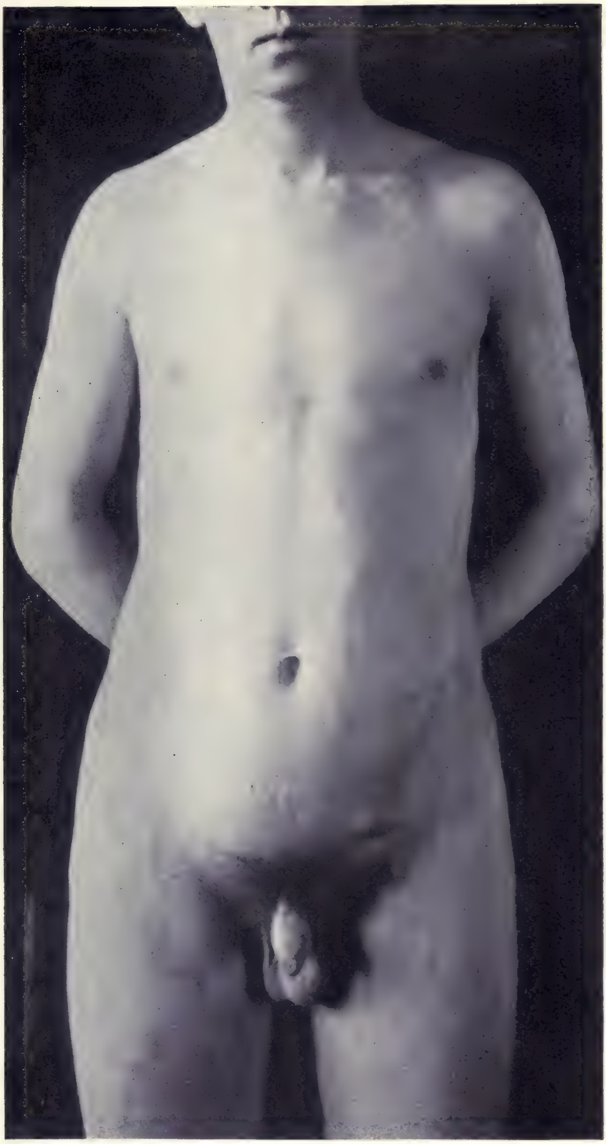

Fig. 178.—Subsidence of enlarged superficial abdominal veins three years after acute metastatic thrombophlebitis occluding inferior vena cava (P. G. Skillern, Jr., in *Annals of Surgery*, June, 1913, 916).

is liable to precipitate gangrene. When the surface veins of the abdomen, chest, and root of the neck are enlarged, occlusion of the vena cava superior—either by pressure from without or thrombus-formation—suggests itself (Fig. 179). These conditions were thoroughly covered in a paper entitled "Two Cases of Caval Occlusion: (1) Vena Cava Inferior; (2) Vena Cava Superior" (*Annals of Surgery*, lv, 919; *ibid.*, lvii, 917).

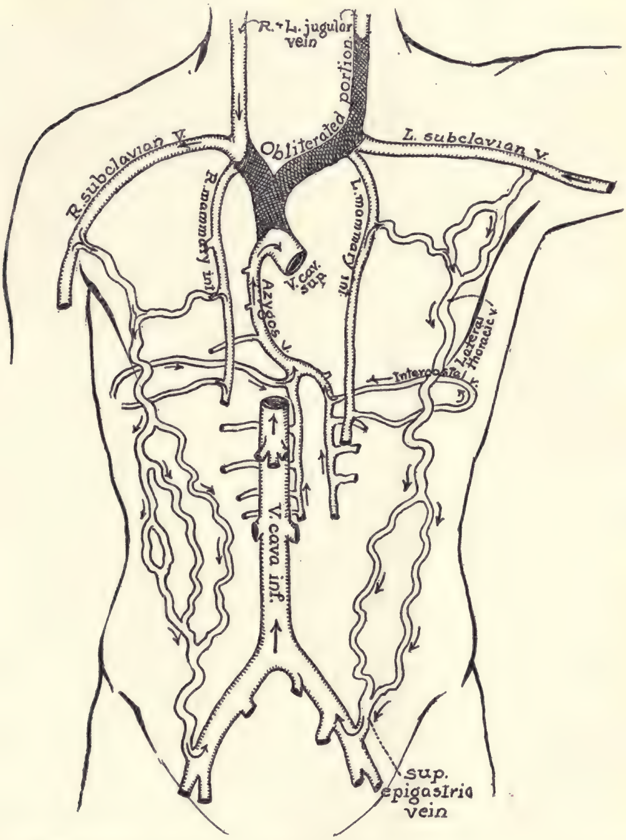

Fig. 179.—Collateral circulation after obstruction of vena cava superior (modified from Osler).

As to the end-results of the operative treatment of varicose veins, of 256 patients operated on by Balfour and others according to the

Mayo method (Fig. 175, p. 783), letters were received from 161. In no case has the lapse of time since operation been less than one and one-half years. In 68 patients the condition was associated with varicose ulcer; in 93 there was no ulcer. Thirty-nine (57.4 per cent.) of the 68 patients having ulcer were cured, that is, the ulcer had healed, the veins had disappeared, there was no swelling of the feet, and the patients were able to carry on their work without pain; 16 (23.6 per cent.) reported great improvement, the ulcer having healed in the majority, but minor complaint of occasional swollen feet after a long day's work, or of some aching in the legs, so that 80 per cent. were either cured or improved. In 13 (19 per cent.) the results were definitely unsatisfactory. The ulcer had either failed to heal or there had been periods of complete healing, then pain and swelling sufficient to make the prolonged erect posture uncomfortable. Elastic bandages kept some of these patients in a fair degree of comfort, but the operation itself had failed. In the 93 patients without ulcer, better results were obtained; 67 (72 per cent.) were quite cured, 16 (17 per cent.) were improved, while 10 (11 per cent.) were unsatisfactory, so that in practically 90 per cent. of this group the results were good.

Balfour (*Journal-Lancet*, August 1, 1916) suggests that the causes of failures in the series may have been due in part to the selection of cases, incomplete operation, or lack of care in after-treatment. A serious complication occurring with some frequency in the long-standing cases is that the chronic congestion and disability incident to ulcer formation undoubtedly predispose these patients to flatfoot, and the breaking down of the plantar arch is associated with the familiar pain common to this deformity. The removal of varicose veins in such cases may be successful to the extent of getting rid of the veins, but the expected relief from pain is not derived.

II. VARICOSE LEG ULCERS

The rational treatment of varicose leg ulcers is summarized in the conclusions to a paper on the subject by P. G. Skillern, Jr. (*Annals of Surgery*, February, 1916, 181).

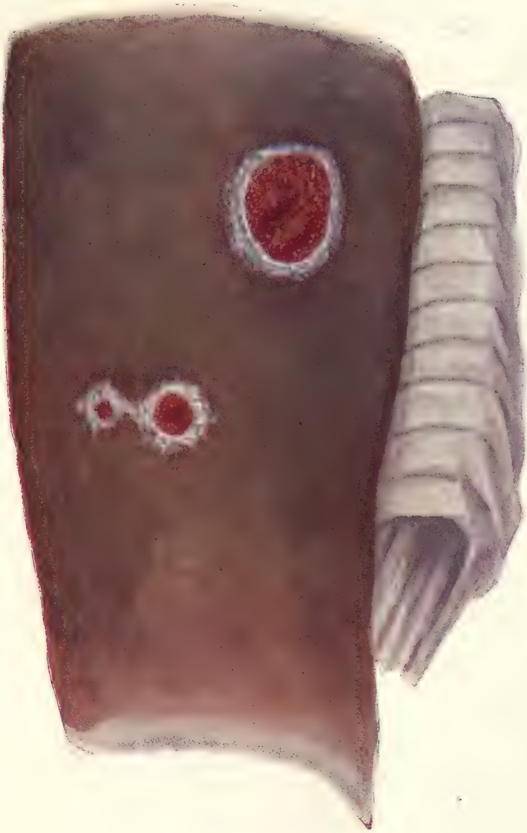

Fig. 180.—Indolent ulcers converted into the classic healing variety by the calomel-adhesive-plaster method. Note firm, bright-red granulations and encircling broad band of bluish-white, rapidly regenerating epithelium. Straps curled back for sketch. (P. G. Skillern, Jr., *Internat. Clin.*, Vol. III, 23d series.)

"1. The rationale of treating varicose leg ulcers is to establish a tendency to heal by combating the pathologic hindrances to healing.

"2. The pathologic hindrances to healing are the sequelæ of chronic venous congestion; and chronic venous congestion, in its turn, is the result of the inability of the vena saphena magna and its tributaries to withstand the attraction of gravity upon the long column of blood contained therein.

"3. Reduced to its simplest terms, the rational treatment of varicose leg ulcers depends upon the recognition and application of the principles of, first, protection of the regenerating epithelial edge; secondly, drainage of the discharge from the ulcer; and thirdly, support of the venous channels from without, thus neutralizing the baneful effects of chronic venous congestion.

"4. The agents employed in the rational or drugless treatment of varicose leg ulcers may be summarized by terming the method the rubber-tissue-dry-gauze-muslin-bandage method. In selected cases the calomel-adhesive-plaster strapping method cures rapidly and efficiently (Fig. 180); while for routine treatment of the average case Unna's zinc-oxid-gelatin paste stocking serves as an admirable and efficient support.

"5. The tendency to healing has been established when the base of the ulcer is covered with healthy, red, vigorous granulations, and when the epithelial edge becomes broader and assumes a pale, bluish-white tint.

"6. If in a case of multiple varicose leg ulcers the smallest ulcers become completely covered with epithelium under the influence of treatment, it has thereby been proven that a tendency to healing has been established, and that in time the larger ulcers will heal, if not too large, excessively fibrosed, or adherent to bone.

"7. Healing of the ulcers having been brought about, it remains to prevent recurrences. Recurrences may be prevented by mechanical or operative methods: mechanically, by the use of a silk-elastic stocking, renewed when worn out, or by a Randolph bandage; and barking of the shin should be insured against by a shin-guard or wool padding of that part of the stocking that covers the shin. If an operation for excision of varicose veins augurs favorably, it should be performed after healing of the ulcer has taken place; otherwise, the operative wound might become infected from the ulcer, and septic thrombophlebitis, with all the attendant dangers of embolism, might then ensue.

"8. The success of the rational, drugless, or mechanical treatment proves the fallacy, as well as the futility, of expecting cure from the application of medicaments, while overlooking the fundamental pathologic etiology of the ulcer.

"9. Fads, such as scarlet red and basic fuchsin ointments, do not promote epithelialization of an ulcer without due regard for the pathologic etiology of the ulcer, and when regard for this factor has been taken into account, the use of such stimulants is unnecessary."

Hyperemia in any form has been recommended and is highly successful in slowly healing chronic leg ulcers, the old but efficacious method of immersion in very hot water being a good illustration: passive hyperemia by an Esmarch constrictor is another example. Sonnenschein (*N. Y. Med. Jour.*, December 19, 1914) uses to very good advantage baking of the part by an electric dry-air oven, the usual treatment consisting of raising the temperature to 250° or 300° F. and maintaining it for twenty to thirty minutes, depending upon the patient. The number of treatments averages three a week. Whenever pain is present, it disappears after a few treatments. Sluggish granulations become healthy and active, and healing goes on with astonishing rapidity.

Smits (*loc. supra cit.*) submits that the only modern surgical method of treatment of varicose ulcers that reckons with etiology is local treatment of the ulcer, combined with stretching or laceration of the nerve, in the territory of which this sore is situated. Nerve-stretching or laceration should not be performed too near to, nor too far from, the sore. When the incision is made too near the sore, one might operate in edematous or sclerotic tissues, and it is possible then to stretch a nerve-branch whose area of supply is too limited. When nerve-stretching is performed too far from the sore, the trophic effect of stretching may be nullified. It is, therefore, necessary to select the external saphenous nerve or the musculocutaneous nerve; at all events, nerve-roots of the same relative size. But, besides this, it is better in cases of extensive varicose sores *to substitute stretching of the external popliteal nerve for stretching of the musculocutaneous nerve*, because the anterior tibial nerve distributes branches, which lie in more superficial layers above the region of the musculocutaneous nerve, and, moreover, provide the deeper layers. It is important to bring these regions under the influence of stretching, in order to act on the terminal branches innervating the muscular coat of the varices.

The following nerves come under consideration for nerve-stretching in the neighborhood of the sore: (*a*) *Internal saphenous nerve;* (*b*) *external popliteal nerve;* (*c*) *external saphenous nerve.* The technic followed in exposing these nerves is the same as that suggested by Chipault in his "*Traité de Chirurgie du Système nerveux.*"

At times teasing the sciatic nerve into separate fibers must be performed, always selecting the classic spot on the lower border of the gluteus maximus.

The ulcer itself, if not too large or too deep, should be removed entire and the wound closed by plastic methods and sutured. The ulcer is excised as a square; the skin sufficiently loosened to allow the flaps being brought into contact and sutured in the form of a cross, without too great tension. To diminish the tension, a relief incision is made from each angle of the square; and between them four small incisions parallel with the sides of the square are made. Such flaps always heal up well and give considerable security against subsequent yielding of the cicatrices.

In cases in which the ulcer is too extensive and it is, therefore, impossible to cover the defects of the skin by plastic operations; or when the skin in the neighborhood of the ulcer has lost its vitality by trophic disorders and become weakened and atrophic or thickened and indurated, one should be content with cleaning up of the sores by the sharp spoon and cutting away the mortified skin with scissors, removing all necrotic tissue and all tissue

ULCUS VARICOSUM.—(*Smits.*)

Sex	Age	Race	Etiology	Clinical Symptoms	Operations	Results	Remarks
W	45	E	Varices after pregnancy.	Varicose sore on the outer side of the back of left lower leg.	(1) Resection of the internal saphenous vein, thorough disinfection with a solution of hydrogen peroxid. (2) Laceration of the sciatic nerve; cleansing the ulcer and removing the undermined skin with sharp spoon and scissors.	No result. Healing per secundam.	
W	50	E	Varices resulting from pregnancy.	Two sores on the inner side of the right lower leg.	Resection of the internal saphenous vein; sciatic nerve lacerated; both the sores cleansed.	Healing by second intention.	
W	65	E	Varices after pregnancy.	For fifteen years a varicose ulcer, 6 x 3 cm., above the internal malleolus of the right leg.	Resection of internal saphenous vein; laceration of the sciatic nerve; sore cleaned up with sharp spoon and scissors.	Healing by second intention.	
W	70	E	Varices.	Inner side of the left lower leg.	Resection of internal saphenous vein; stretching of internal saphenous nerve; cleansing the sore.	Healing by second intention.	
M	75	E	Varices.	A sore in the middle of the right calf, 8 x 4 cm. in dimension. Above this sore a varicose tumor.	Resection of the varices between a ligature above and below the varicose tumor. Sore cleaned up with sharp spoon and scissors; laceration of the sciatic nerve.	Healing by second intention.	
M	45	E	Varices.	Varicose sore, 3 x 6 cm., on the lower outer part of the left leg.	Disinfection of the sore with a solution of hydrogen peroxide; extirpation of the base of the sore; excision of the sore; loosened skin-flaps drawn over cleansed base of ulcer; suture; laceration of sciatic nerve.	Healing by first intention.	
W	60	E	Varices.	7 x 5 cm. sore on the front, inner side of the right lower leg.	(1) Sore cleansed; internal saphenous nerve stretched. (2) Sciatic nerve lacerated; sore cleansed again with sharp spoon and scissors.	Recovery and relapse in three months. Healed.	
W	56	E	Varices.	Sore 3 x 4 cm. on the outer side of the right lower leg, below the ankle.	(1) External saphenous nerve stretched; sore cleansed with scissors and sharp spoon. (2) External popliteal nerve stretched; sore again cleaned up.	No results. Healed.	
W	40	E	Varices after pregnancy.	Left inner ankle.	Internal saphenous vein resected; internal saphenous nerve stretched; extirpation of the sore, plastic covering of the defect of the skin by forming "living elastic stockings."	Healing per primam intentionem.	
W	42	E	Varices after pregnancy.	Lower outer part of left calf.	(1) External popliteal nerve stretched; sore cleaned up with sharp spoon and scissors. (2) Sore again cleaned up; laceration of sciatic nerve.	(1) Recovery and relapse in one month. (2) Definite recovery.	

M	57	E	Varices.	Lower outer side of right calf; sore 7 x 5 cm.; large dilated varices on the inner side of the knee.	Excision of the sore; extirpation of the bunch of varices, after having placed a ligature above and below; plastic covering of the defect by loosened flaps of skin; laceration of sciatic nerve.	Healing by first intention.	
M	46	E	Varices.	Lower part of right calf.	External popliteal nerve stretched; sore cleaned up by sharp spoon and scissors.	Healed.	
M	62	E	Varices.	At left malleolus internus.	Excision and extirpation of the sore; plastic covering of the square defect—four relief incisions between the sides of the angles; lacerating the sciatic nerve.	Healing by first intention.	
M	35	Ch	Varices complicated by tropical sore.	Outer side between upper and middle third part of the right lower leg.	Ulcer cleaned up; varices extirpated; sciatic nerve lacerated; plastic covering of the square wound, forming "living elastic stocking."	Healing after treatment for three months.	**Published in extenso in *Tijdschrift v. Nederl. Indie*, 1914, page 674.**
W	42	E	Varices.	On and above right malleolus internus, 6 x 4 cm.	Extirpation of sore by elliptic incision, plastic covering by the loosened flaps of skin, extending the incision about 20 cm. upward and a little down the ellipse—relief incision at middle of the calf; laceration of the sciatic nerve.	Healing by first intention.	
M	25	Jap	Varices.	Two sores: (*a*) on the left lower leg, a chronic, evidently long-existing sore; above the left malleolus internus trophic disturbances of the skin in the neighborhood of the ulcer; (*b*) sore at the middle of the left calf. A varicose tumor below the hollow of the left knee.	Extirpation of the varicose tumor; after radical cleansing of the sore *a*, on and above the left malleolus internus, elliptic excision of the ulcer on the calf *b*, eight stitches in the loosened flaps. This latter ulcus was cured. The other, which could not thus be cured, was cleansed again with sharp spoon and scissors. Laceration of the sciatic nerve.	Healing first sore (*a*) by second intention. Second sore (*b*) by first intention.	
W	20	J	Varices after pregnancy.	At the right outer ankle a sore of the size of half a crown. Varices all over the lower leg, meeting in the hollow of the knee.	Resection of the saphenous vein. Radical cleansing of the sore with sharp spoon and scissors. Laceration of the external popliteal nerve.	Healing by second intention.	
W	23	E	Varices after pregnancy.	Extensive ulcer on and above left malleolus internus.	Portions of the dilated saphenous vein resected. Sore cleansed with sharp spoon and scissors; laceration of the sciatic nerve.	Healing by second intention.	

whose vitality seems diminished; then cicatrization should be promoted by efficient treatment of the wound.

In the former instance the wound heals by first intention; in the latter, healing is obtained by granulation.

Appended is a table showing the application of Smits's method (p. 792).

III. VARICES AS A CAUSE OF SCIATICA

We have often pointed out in these pages that "sciatica" is in most cases but a sign of trouble elsewhere, and that it should not be treated with the eyes glued on the sciatic nerve itself. From sciatica to varicose veins seems at first glance a far cry, but reference to Edinger's article on the affections of peripheral nerves in "Handbuch der gesamten Therapie von Pentzoldt und Stintzing," 1910, S. 411, shows that four causes are attributed to sciatica, the fourth one being deep varices.

In a special investigation of this subject at the Frankfort Pathologic Institute, Reinhardt (*Frankfurter Zeitschrift für Pathologie*, 1913, Bd. xiii, S. 353–89) examined the sciatic nerves in 100 cadavers and found varices of the sciatic nerve in 25. Of these 25, in 9 the varices involved the sciatic nerve alone, the remaining deep and subcutaneous veins not being dilated; in 12 the varices of the sciatic nerve were combined with dilatation of the subcutaneous veins, and in 9 cases with deep varices, while in 6 all three varieties were combined. In 3 aged women the scars of large varicose ulcers were found. In most cases both sciatic nerves were fairly equally involved; in many the nerve of one side was involved to greater extent than its fellow; while in a few the varices involved the nerve of one side alone.

The effect of the varicose veins upon the involved nerves was chiefly an increase in the interstitial connective tissue, which, as microscopic examination revealed, always began around the vessels and then involved the nearest nerve-bundles, while in cases of extreme varicosity dense, sclerotic masses of connective tissue were found around the dilated veins and nerve-bundles, at times pressing in between the nerve-fibers: true degeneration of the nerve-fibers themselves was not, however, found in the small series of cases.

The same causative factors were attributed to the varices in the sciatic nerve as obtained in the usual superficial and deep varices of the lower extremity.

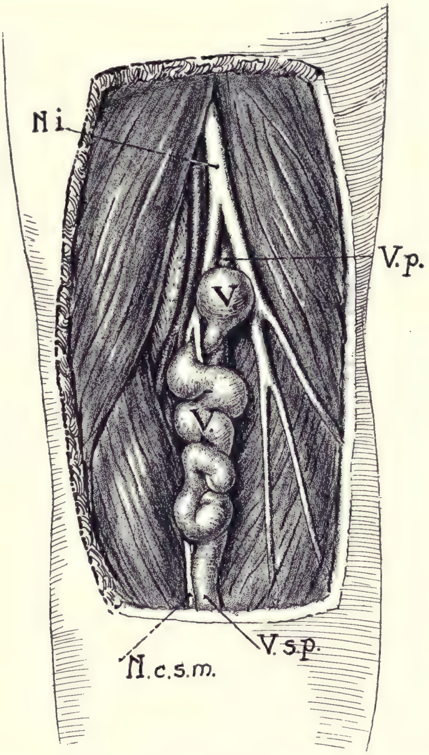

Fig. 181.—Large varices in the popliteal space in intimate relation with the nerves: *N. i.*, Nervus ischiadicus; *V.p.*, vena poplitea; *N.c.s.m.*, nervus cutaneus suræ medialis; *V.s.p.*, vena saphena parva; *V.*, varices (Reinhardt).

It is probable that the physician often encounters cases of varices of the sciatic nerve in which the symptoms—perhaps not very pronounced—are charged to other causes.

The clinical symptoms (sensation of heaviness, numbness, dull pains deep in the thigh, etc.) are, of course, due to the accumulations of excessive amounts of blood in the veins of the

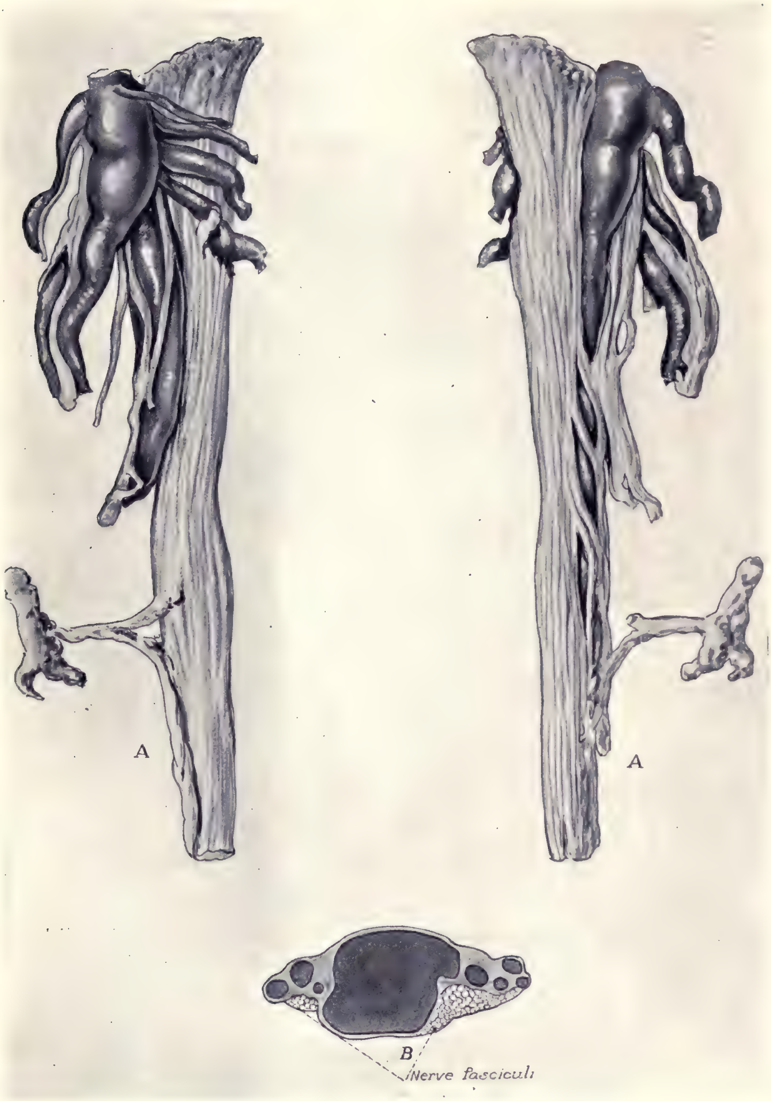

Fig. 182.—*A*, *A*, Anterior and posterior views of the markedly dilated and varicose vena glutealis inferior et ischiadica and branches. *B*, Nerve fasciculi in a transverse section of the vena glutealis inferior (modified from Reinhardt).

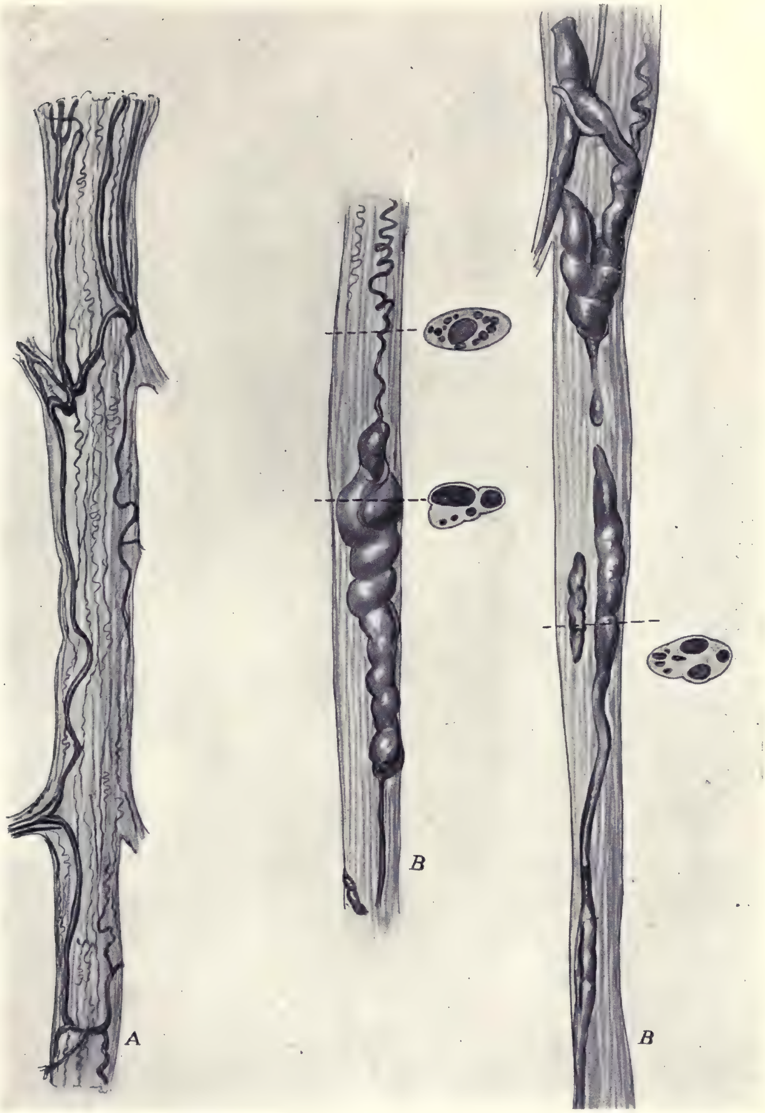

Fig. 183.—*A*, Injection of the veins of a normal sciatic nerve. *B*, *B*, Left and right sciatic nerves. Note huge varices. The cross-sections show the relative positions of the numerous varicose veins (modified from Reinhardt).

nerve: they therefore disappear when the patient is recumbent with the legs elevated, and reappear—usually in the direction from the foot to the hip—when the patient stands and remains standing for a long time. In contrast to true sciatica the pains are not present during walking or other exercise, doubtless because of the *vis à tergo* initiated and maintained by the contracting muscles: so, too, the typic painful pressure-points of true sciatica are wanting, while in sciatica of the neuritis type the pain is greatly aggravated by elevation of the limb to the point of stretching the nerve. It is true that thromboses and inflammatory changes of the varices may give rise to neuritic processes and thereby to the manifestations of true sciatica.

In cases severe enough to demand surgical treatment—even though the diagnosis depends upon exploratory operation—it seems that ligation and resection of the varicose veins would be the proper procedure, not forgetting that varices may be present within the nerve, of which there may be no indications when the nerve is examined on its surface: in the latter case teasing the sciatic nerve into separate fibers, as Smits (*loc. supra cit.*) recommends to bring about healing of varicose leg ulcers, may be necessary properly to expose and remove the varices.

The appended cuts from Reinhardt's article illustrate the subject of varices of the sciatic nerve very clearly (Figs. 181, 182, 183).

CLINIC FOR THE BALTIMORE AND OHIO RAILROAD SURGEONS

HELD BY DR. MURPHY AT MERCY HOSPITAL, JUNE 15, 1915

DR. MURPHY: I wish to express to the president of your organization my appreciation of the honor of the invitation to present some cases to you today and to take up certain phases along the line of treatment of the class of cases in which you are most interested. I was requested not to operate, and so shall merely bring into the clinic for demonstration the cases which I think will make the strongest appeal to you as railroad surgeons.

Case I.—A form of injury which railroad men suffer at times is that of burns. Of the cases that come into this hospital, if you should ask me which ones show the greatest defect in management from an accident viewpoint, I should say that there are four types of injury which exceed in mismanagement all the others combined. The first is Colles's fracture; the second, Pott's fracture; the third, burns; and the fourth, fractures of the elbow-joint.

Now, then, burns are of varying degrees. Here, you can see, is what is known as a "flash" burn—that is, this man was riding through an oil field with a gasoline engine when the benzin in the oil ignited and fired his engine. You can see that his face was rather badly burned, but his sleeves were rolled up, and his hands were so badly burned that they were functionally worthless.

In the management of this class of cases from the beginning, how can this case be handled, first, so as to conserve the usefulness of the member, and, second, so as to lessen the period of invalidism? What should you do with it primarily? What should you do with it from a secondary standpoint? A picric acid or an oil dressing is all that is indicated. Remember, if you use boric-acid solution you can get an intoxication—in fact, you do get an intoxication in some of these cases. You should never use iodoform. If you wish to see a typic iodoform intoxication, take a first-degree burn and tear off all the blistered cuticle and cover the raw surface over with iodoform. Then come back and see the man trying to dig his head into the pillow,—usually on the right side,—which is the first indication of iodoform intoxication. They get an intense intoxication with iodoform when placed on deep burns. Alcohol is gaining favor as a primary dressing for burns, but here again the medicament must not be spread over too great an area at one time.

This was not a deep burn—it did not involve the true derma except in small areas—and still, what is the result? A worthless forearm and a worthless hand—two worthless hands. What a terrific calamity that is to a young man! Had double amputation been performed you would have said that such operative measures seemed very extreme, but from a service standpoint the postoperative result would not have been much worse than the present deformity.

In the management of burns after the exfoliation or throwing off of the slough,—whether of the first, second, or third degree,—what have you left? At first, granulation tissue. What do you want to wait for after that time? Why do you wait six months or a year before grafting skin? The day to begin grafting a burn—and the graft should always be an *auto*graft, always from the same individual—is the day the slough is thrown off or the next day, as soon as you can make preparations to do the work. Why? Every day you let that burn remain without grafting after the slough is off you have an additional deposit of connective tissue at the base of the granulations. What does that connective tissue do? It consolidates and contracts: if you wait until it is dense enough—a month or two—and then put your graft on, the graft will adhere and look very fine, and you will consider yourself a great artist. Sooner or later, however, there comes slowly but surely the contraction of the cicatricial tissue that has formed and the graft necrotizes. That is all to be charged to the fact that the granulation tissue was permitted to remain and develop connective tissue beneath it. Now what is the remedy? The remedy is to begin grafting the day after the slough is off. After you put on the graft you must keep it dry. We do dry grafting all the time; then we put on a wire gauze cuff around the graft and seal the end of it—just as you would seal a test-tube. That form of dressing does not permit any object to touch the graft, such as occurs when rubber tissue is used. Then put the wound in a favorable position for drainage, so that it will drain not through the graft, but in a distal direction. The wire gauze protector in grafting is put on for the same purpose as a vaccination shield is put on for, and has exactly the same principle—to keep the healing area dry. The wire gauze retains its cage-shape with the aid of adhesive plaster.

What has this man to contend with now? The whole burned area is covered over with skin—not with derma. Before it was covered over with skin the outer half of the derma developed cicatricial tissue, and there is a contraction that cannot be overcome by massage or any other measure short of dividing the skin through and through to the tendons, freshening the tendons, and putting in a viable, elastic transplant. If you use fatty tissue beneath the transplant, the latter will stretch from 30 to 50 per cent. of its original size when inserted.

Here is the operation: we have marsupialized this and we have elevated that. We cut it here and slipped that piece down and slipped the other piece up—in other words, over that angle we made a mitt. It is not cut until it is healed. As we take it off we just cocainize it and take it off section by section. It is eleven days since that was put on—nothing but a dry dressing, just protected in that way. Keep the base dry in any kind of grafting. When we take it off in fourteen or fifteen days we shall just split it and bring it around the thumb and finger, so as to give him a hand that will be of service. Then he will not be through—he still has other troubles. You will note that on the left hand he has what is known as an annular scar. An annular scar is always a dangerous scar when it involves the entire circumference, because when the muscles are worked tension is thrust upon it.

You have seen scars in the fold of the elbow—enormous keloid masses, dense and painful. Wherever you have an angle that puts tension on a scar—whether it is an incision or a burn—there you have a superlative tendency to the production of more connective tissue, with more keloid, more pain, and more discomfort. The danger threatens that this tissue will contract sufficiently to necrotize these fingers, as you remember occurred when we performed the Schede operation for varicose leg ulcers, after which there took place by degrees more and more contraction, and eventually gangrene. At one time we had in the Cook County Hospital two patients with gangrene of the foot resulting from the annular scars following a Schede operation for varicose veins. Relief from or prevention of such a condition may be had by breaking the continuity of the scar. If a graft of normal skin only one-half as wide as the scar be inserted, all that cicatricial tissue will soften and disappear. I shall take a strip of skin from his side 1½ to 2½ inches in width and put it in from here to here [indicating]. If it should heal in, then the scar will entirely absorb—that is, it gets softer and more pliable and then disappears. You have two important indications to meet: First, you must supply him with tissue that is elastic enough to permit him to close his fingers; secondly, you must provide some agent (normal skin) that will take the tension away from that hand.

Now, then, burns of the second degree must be grafted the day the outer half of the skin sloughs off. Burns of the third degree must be grafted just as soon as the slough is off. Every day you postpone matters is a day of injury to the patient, and permanently retards the progress of repair.

There is the plan. See how simple it is! You can put a bandage around it, and it cannot possibly come to the skin. It fits the place, always using this as a support,—or as a collar,—and that keeps the wound perfectly dry. All bleeding must be stopped before the graft is put on.

Case II.—Here there was a very nasty fracture near the knee-joint. You see that gypsum case includes the whole hip, and a window has been made in the plaster through which to dress the wound. When the patient was admitted there was non-union, despite a plate which had previously been inserted. The apposition of the fragments, too, was good, but still there was not the slightest effort at bony union—why, we do not know, but the clinical fact is that the number of cases of non-union is increasing every year in direct ratio to the superlative degree of immobilization. Whether or not that is the correct interpretation of the situation, the clinical fact remains as stated. We have constantly in hospital from 6 to 10 cases at a time of non-union where the fixation had been of the superlative degree. In the management of this case we had to remove the plate.

Case III.—This man came in walking on crutches—this is another type of case. When you look at the shadow-box you see two skiagrams showing a spiral fracture of the femur with an overlapping of many inches. His attempts to walk about on the hip developed a capsule which was so dense and firm that you would think it would carry 1000 pounds. A piece of muscle had interposed itself between the fragment-ends, so that union was rendered impossible, and a typic fluid-containing or hygromatous pseudarthrosis resulted. It took us nearly one hour to free the ligamentous tissue that inclosed the pseudarthrosis, but we finally succeeded in clearing it away, and we cleared it away for three inches above and below the site of pseudarthrosis.

In this case—one of non-union—a plate was inserted, which is against the rule. This exception proves the rule. He was in here not because of failure of union, but because of the interposition of muscle, which resulted in a typic pseudarthrosis. After freshening the ends of the bones we put in a plate, and any fragments of bone which we had to take out we put back beneath the periosteum. In operating for non-union it is not only necessary that you take out the fibrous tissue and cartilaginous tissue which is interposed between the ends of the fragments entering into the pseudarthrosis, but also that you elevate the periosteum one inch above and one inch below the line of approximation: split it and lift it up with the periosteotome, otherwise it will immediately begin to reproduce bony tissue over the ends of the fragments. Whether you use a bone-transplant or a Lane plate the same precaution should be taken of elevating the periosteum as in an amputation. All the older men who were in my class will recall the times we used to reflect the periosteum and, after sawing through the bone, bring it down over the stump. We long since abandoned that method, because it occasionally resulted in an intensely painful stump. By cutting the periosteum square off and sending it out with the amputated limb there remains a stump that is free from pain and sensitiveness and enormously better in every respect.

It is now seven weeks since the operation was performed. We shall keep the patient about five weeks more, making about twelve weeks in all before he is allowed to get up. In many of these fracture cases we have been making a mistake in permitting the patients to get up too early—long before there has been time for osteogenesis after opening a fracture or putting in a graft. It takes longer for these cases because they do not have the assistance of a blood-clot to form a framework through which osteogenesis may take place. At the end of twelve weeks we shall have a skiagram taken. You see the perfectly plumb line we have secured. You see the fragments of bone there on the side that have been put in to stimulate osteogenesis. You remember when we used to take these bits and throw them out into the scrap-heap. Now we utilize them all, as they aid in filling up the mass and in forming a blood-clot that is so essential to union.

This case is the exception to the rule, and you see why: it is because we have a law against using a bone plate where non-union has occurred. That is Lane's advice. "Never" means where the bones have been in apposition, but have not united; never where the cause of non-union is failure of osteogenesis, but where it is the interposition of tissue, that is an entirely different proposition.

Case IV.—Here is one of the class of cases which we are going to accentuate particularly today, and that is the fractures near joints, which get us all into trouble, no matter how careful or how painstaking we are. This boy was in a hazing bout in his academy, and as a result he had a fracture in the epiphyseal line halfway across and then an upward split, with displacement of the fragments, as the skiagram reveals: the proposition is how to control that lower fragment. In fractures near joints we have worked out a method which we call the non-bloody nailing of the lower fragment—that means the fragment near the joint. Here you can see the posterior displacement of that fragment, showing that if it were permitted to remain in that position, his extension would be obstructed by the pressure of the patella against the tip of that fragment, and he would be practically out of commission as far as the usefulness of the joint is concerned.

What is the line of treatment? To insert a plate or a nail. If we should insert a plate, we would have to compound the fracture—in this case into the knee-joint. Should infection arise, what are you sure to have? Either loss of the limb or bony ankylosis and permanent incapacity of the joint. No matter how familiar you feel with asepsis, no matter how well trained you feel in doing that work without hand contacting with the wound, you are restless the night of the day you perform an operation that involves the hazard of putting in a plate. Were it my knee, of the two hazards between putting in a plate and going without operation, I think that I would choose the latter as the lesser of the two evils.

What did we do in this case? We carried out this plan of repair that I have been talking about for such a long time. After correcting the deformity—and I shall show you the skiagram taken after correction of the deformity—we had the patient's knee in this position [indicating], pulled around into shape, and we wanted to keep it there. If you will remember, the elongation of the synovial membrane is across this field. There is no synovial membrane there at all—nothing there but skin and connective tissue leading down to the bone. We just nicked a hole in the skin large enough for the nail,—that is, a fourteen penny nail,—and drove the latter right straight through after we had adjusted the fragments and when we felt that they were in position. You do not do that the first day. You do not do it before the fifth to the tenth day—never immediately after the accident, never until the wound is fully over the inflammatory reaction to the trauma and therefore has the highest response against saprophytes. You drive that nail in, and then, with a horsehair stitch, close up the hole. You have not compounded your fracture, you have not exposed your knee-joint, you have not made a single incision except the one large enough to admit the nail. You hold the skin retracted with a small retractor, so that the nail and the skin do not contact: otherwise you may have an infection from the skin. Remember, when you put in a foreign body you always have the danger of infection, because the tissues have not the response against infection.

Case V.—This skiagram reveals a case of impaction of the tibia, an impaction of the external and internal tuberosities. When you put the patient up to make the test you find that the leg is adducted or abducted, thrown in or out through the impaction. You get no crepitation because it is impacted. The difficulty in that case is to reduce the impaction. You often have to take the limb and bring it clear to the opposite side before you can loosen it. When you have brought it clear to the opposite side, then with the tibia far in you drive your nail in on the angle you wish to hold it. That is the only operation. The wound is closed with two stitches.

Case VI.—This skiagram reveals a fracture of the patella that got good union by wiring with the circular wiring method. In fractures of the patella you must notice the line of division, because the capsule of the patella often tears irregularly, or the aponeurosis of the patella falls in over the fractured edge. By treating such a fracture with a circular suture of phosphor-bronze wire you will get union unless you have elevated the aponeurosis out of the field and you have to open it. When you have opened it, do not touch a sponge to it—do nothing but take out the capsule. We sew it over the patella to steady it, and then pass the phosphor-bronze wire through the quadriceps tendon above and the ligamentum patellæ below, and tie it as you tie a ligature. With a sixteen-strand phosphor-bronze wire tied, you have a strength that will carry the weight of the patient. This phosphor-bronze wire is known as Hyrtl's wire and originally was made in Vienna. We have used it a great many years.

Case VII.—This was a case of fracture with non-union in which a bone-transplant had been made. You see, there is the bone-transplant as it was when the patient came to us. You see the bone-transplant sticking out of the lower fragment. So much motion had occurred during the process of repair that only the lower half of the transplant united. I have been insisting from the beginning that when you make a bone-transplant you have an entirely different process of repair from what you have when you have a fracture, and that you must have superlative immobilization in order to get regeneration of the vessels of the bone into the graft. If you do not have superlative immobilization, that motion of your graft develops a connective-tissue capsule, and the Haversian vessels do not get in: you do not have osteogenesis and you do not have union. That is what this man had. Now, then, in that case he had in a bone-graft that was already regenerated from below. I did not take that out—not at all. I took off the periosteum for two inches above and two inches below and freshened the end. Here in the picture [indicating] you will see the deposits of bone that I chipped off from the side. We get union from that just as well as if I had taken a fresh graft, and so much better because it is united at one end.

Case VIII.—There, you see, is an illustration of what I said a moment ago about perfect apposition. No man could get better apposition than that, but still there is not the slightest effort at osteogenesis. That is what I am calling attention to: there is splendid apposition, but not the slightest effort at union, showing that "something is rotten in the state of Denmark." It is not the doctor's fault: the work was well done and under aseptic precautions, the apposition is good, but still there is no effort at osteogenesis. Look at that! One could not ask for better apposition. This was treated with a bone-transplant from the other tibia. Here we do not have what we had in the first case,—the interposition of a mass of tissue preventing the fracture from uniting,—but contacting with no effort at osteogenesis. You must put in something that will stimulate osteogenesis. Here is where we took out the graft [indicating]. We have never had any trouble in the leg from which the graft was removed, and we have had almost 100 cases now.

It is now seven weeks since the operation was performed.

The patient will be kept in bed for sixteen weeks until the bone is fully regenerated.

Case IX.—Here is one of a class of cases that come to us very commonly, and that is, diseases of the hip-joint. One of the commonest of all joint diseases is tuberculosis of the hip-joint. Cases of tuberculosis of the hip-joint are managed fairly regularly and systematically in an incompetent way—that is, they are dressed in an ambulatory splint, the shoe on the opposite foot is elevated, and the patient is permitted to get about. He goes along for one year, or two, three, or four years, and as the head and neck are absorbed the neck eventually slips over the acetabular rim and runs high up on the dorsum of the ilium. What is the result? The patient comes to you with an adducted and fixed thigh that it is impossible to bring out into abduction. Is that not the story? I should like to have every man present ask himself about how many cases of movable hip-joints he has that began with tuberculosis of the hip—and some of you have been engaged in active practice for a third of a century. You do not need your fingers and toes to count them on: you can usually count them on one finger—and that your little finger—because if it is a movable joint it is a very defective joint. The results have been bad and are continuing to be bad. Why? Because we have endeavored to follow out the ambulatory splint management of these cases in order to give the patients air and light. You can put wheels on the bed and wheel them out-of-doors and take them anywhere you wish. Now what happens when you permit that child to get about? The head absorbs and the neck absorbs and finally the neck slides over the margin of the acetabulum and mounts up on the dorsum of the ilium. Look at that skiagram! That girl's limb is 4½ inches short,—not real, but apparent, shortening,—because the acetabulum has to go up in order to let the limb come down: that is, with the limb in this adducted position, in order to let the leg come down straight she has to tip her pelvis. As you look at that skiagram you can see that the trochanter is just a little above the level of the acetabulum. What is the defect in the management? The defect in the management is permitting that limb in the early days of the disease to assume the adducted position, crossing over and closing the pelvic outlet. Such adduction deformity will not occur if you start that patient right, either with or without a gypsum case, but in any event with double abduction—not single abduction, but double. You cannot produce abduction by turning out one limb, because if you abduct one limb alone, the pelvis swings around and you may think you have abduction, but you have not—the pelvis is just tilted, that is all. But if you put both legs in the abducted position then you know you have abduction. Now, then, with the limbs in the abducted position, if the head of that patient's femur begins to absorb and to break down, the more it absorbs, the deeper the neck goes into the acetabulum. That is all there is to it. Then when the tuberculous process is cured the limb is ankylosed, but in such a position as is favorable for the later performance of arthroplasty. The joint is ankylosed, but the patient does not go around with a limb four inches short, but with one of full length. The pelvis tilts a little, but the neck never goes up on the dorsum of the ilium because the limb is kept in the abducted position from the first day. *The ambulatory splint is not the splint for the management of tuberculosis of the hip.*

This is the idea we had to come back to. We had to do something for this girl to relieve her of that limb coming across the pelvis. We went in subcutaneously and divided all the adductor group of muscles—which had been shortened in their attachments to the pelvis—clear down to the tuberosity of the ischium. There is the little slit we made here in the skin: it has closed up, and you can scarcely see where it was made. Very good abduction was obtained. Following the Lorenz method, after you have once divided the muscles, slowly work the limb out until you get it into abduction and then just keep it there for a number of weeks until it becomes fixed with fibrous tissue to the dorsum of the ilium. As you approach the dorsum, the fibrous tissue becomes denser and firmer. The pelvis again begins to tilt in the opposite direction and so compensates for that 4½ inches of shortening by having the limb come down to the proper level. While we do inject formalin and glycerin into the tuberculous cases, yet we do not advise it. Tuberculosis is almost universally a bone lesion,—not a joint lesion,—therefore the formalin does not get into the tuberculous cavity: that is why we cannot recommend it. We are endeavoring to differentiate between primary synovial tuberculosis and primary bone tuberculosis, but find it extremely difficult to do on the most careful analysis. We are trying to see what results we can get with formalin and glycerin in the synovial type, but the number of cases is not large enough to justify our advising it as a routine measure: therefore, in none of my articles will you find it mentioned as a treatment for joint-tuberculosis. It is not the proper treatment—not at the present time, at least. We have two of these cases in the house now.

Case X.—This patient was operated upon a week ago Monday. She has developed a fairly good capsule, but has some pain, some adduction, and some shortening. We treated her in the same way—brought the limb clear around. She is going to have a good joint, because she has a good, firm capsule. She has flexion and extension, but the limb is drawn in that adducted position until it has become five inches shorter. By correction of the adduction deformity, in place of slipping over the acetabular rim, the cervical stump will pass upward into the cavity nature has prepared for it, which gives splendid support.

That is the line of treatment that must be instituted until the tuberculous process has entirely healed, and you have left a patient who will stand additional trauma and additional pressure without starting up new manifestations of the disease.

Case XI.—This abduction splint which we use is known as the Rainey splint: it is built in a way that permits spreading to any degree and is easily adjustable. Within twenty minutes you can make one yourself with nails and a couple of boards. It was designed by one of our interns.

Here is a case of fracture of the neck of the femur close to the head: at operation we found only a small mass of bone in the acetabulum—so great had been the absorption. There is another essential element to speak of regarding absorption of the neck: when the fracture takes place out in the trochanter, if you immobilize that with anything like good apposition and keep it immobilized by Buck's extension for eight or nine weeks, you get union, as a rule. When the fracture occurs within the capsule, you rarely ever get union. You remember the elder Gross said, in the last edition of his great work, that he did not believe he ever had union of an intracapsular fracture. Now you know heads of femurs have not changed any since Gross's time, having exactly the same histologic elements that they had then, so that in managing them we must work out another principle than that resorted to by Gross, which was putting on extension and splint with counterpressure up against the muscle—all to no purpose, however, and leading to failure of union. Whitman then came along and advised double abduction with or without extension. Whitman's principle, I believe, is the proper one for the management of all these cases, with the addition that it must be kept up for at least sixteen weeks—that is, four months. If you can immobilize that head and neck with a double abduction splint—that is, superlative abduction of both limbs—it forces the neck in against the head and keeps it there all the time. Do not let the nurse come along and lift that limb up every two or three days to sponge it. Do not let her lift up the weights while she sweeps the floor in the morning. The pressure must be continuous.

Now, then, when we come to this particular case, after we had freshened the neck, we feared that if we put in the screws they would not hold, because there was not enough of the head left, so we took and put the screws through the trochanter and through into the ischium, as you see in this skiagram [demonstrating]. Here are the two screws—one passing through into the ischium, the other passing below the head and not touching the head at all. Of course, that cannot get away: it stayed there. If there is such a thing as immobilization, it was accomplished in this case. Tomorrow it will be seventeen weeks since the operation, and we shall take out the screws. If she is going to have union at all, she will have it now. We shall take out the screws so as to permit motion. She has absolute apposition. These screws go clear through here into that mass of bone [demonstrating].

Case XII.—Here is a fracture at the base of the neck of the femur extending clear out into the trochanteric zone—an entirely different proposition from the last case and treated in an entirely different way. The lesion is being treated by extension and an abduction splint. The patient will be kept in bed ten or eleven weeks. We believe that she will get union without any operation at all.

Now let us take up the question of what happens in the average fracture of the neck of the femur. Nothing shows more beautifully than these two skiagrams what takes place. In this skiagram [demonstrating] you can see that there is no line of demarcation showing the fracture. Of four doctors in consultation, three said from the skiagram that there was no fracture, and the fourth insisted that there was. On the basis that the three men were correct the patient, wearing his crutches, was permitted to go to Europe, starting a short time—two or three weeks—after the accident. When you look at that skiagram and analyze it, there is just as positive evidence that that is a broken hip as there is that that one there is a broken hip: the angle is changed and the neck shortened; typic impaction is seen. If, when that impaction began, the limb had been dressed with a double abduction splint, bony union would have resulted without the impaction ever having softened up. In every fracture, however, whether or not impacted, osteoporosis takes place at the site of fracture, and before regeneration takes place you must have softening, which has no opportunity of manifesting itself when the limb is properly immobilized.

But this patient was permitted to walk about on his crutches: here is the next skiagram, taken six months later. See where the head has come around to! Here is one made in September, 1912. See where the head is now! The entire neck has disappeared from absorption. The patient was permitted to be on his feet the whole time. There is a line of fixation that the process of repair could not have made. You see the superlative abduction we have secured. We fixed the fragments with three screws.

That skiagram tells the story of what occurs in impacted fractures of the neck of the femur better than all the bones in Christendom. Just look at it! See the changes that have occurred with time! That impresses upon you what must be done in this class of cases—immediate and continuous immobilization during the process of osteoporosis and the subsequent one of osteogenesis, which is a matter of from sixteen weeks up, with the pressure always in one direction and always forcing the neck into the head, just exactly the same as in the case of tuberculosis of the hip-joint. Abduction, you see, puts the adductor group on tension, and the more you abduct, the more the adductors force the head in and immobilize it.

Here is a case [demonstrates skiagram] of trochanteric fracture treated without operation: the limbs were dressed in double abduction and maintained in that position during the process of repair.

Case XII.—Here is a man who had an elongated ligamentum patellæ: so long was it that the lower end of his patella was on a level with the articular margin of the femur at the intercondyloid notch and pushed out, so that when he got to a certain position his knee shot out. To shorten the patellar tendon is neither easy nor a sure procedure. What did we do? We just took and chiseled out a square segment inclosing the tubercle of the tibia and just lifted it up. Then we sawed out a section of tibia above and below and slid the tubercle-bearing block downward, holding it in place by fastening one of the removed segments above it. It is now six weeks since the operation was performed, and the patient has a bony union that will hold, and that you know will not stretch. He has bony union of that mass of the tubercle of his tibia one inch below where it formerly was. He will be back on his job without any inconvenience.

Case XIII.—This case brings us to the management of Pott's fracture, which furnishes the largest percentage of evil results of all fractures except that of Colles. Why? Because they are neither properly reduced nor properly retained when they are reduced.

What happens in a Pott's fracture? It is first and always an *ab*duction fracture—that is, when the injury is received the foot is always turned *out*, never in. Where does the pressure come first? Against the tibia and the fibular malleolus. What prevents this pressure of the astragalus from stretching the interosseous ligament? The rule is, when the fibula breaks it breaks from within downward and outward above the interosseous ligament. Finally, if your pressure continues after your bone breaks, what happens? This sharp edge of the astragalus goes up under and splits this interosseous ligament. Then if the force continues still further, what happens? It pulls off the tibial malleolus. Then if the weight continues on it still further, what happens? The astragalus splits off the posterior articular portion of the tibia, and posterior displacement of the foot results: this is the most dangerous thing of all in connection with Pott's fracture. When you come to dress such an injury and endeavor to bring the foot around, you can never bring it around to a right angle. Why? Because your tendo Achillis is too short when you change the center of your fulcrum pressure, and because you cannot bring it around, you know there is a posterior displacement of the foot. Do not try to reduce it by dressing it forward in that way [demonstrating], because you lock it more and more all the time.

Now let us see what the reduction should be. This can never come forward to that position except as the man goes down. When it breaks, the leg comes almost on a level with his foot, and it slips over. See how it goes over! And it leads to what? You see the hyperextended foot. Make a skid of the articular surface of the astragalus and swing it around. If you have reduced it properly you should have no trouble at all in producing an acute dorsal angle with the leg. That is number one: it effects the reduction. The next thing is to displace your astragalus inward by freeing the foot and pushing it *en masse* inward: it cannot go too far if your fracture is above that point, because the fibula will block it. Then dress it as far as it will go if the fibula is broken above the articular surface of the tibia. If it is not broken there,—if it is broken below,—then you can get it to go in too far: that is the sole condition in which you can dress it in too far. Dress it thoroughly *ad*ducted and a little better than a right angle on the tibia.

That is the regular dressing for Pott's fracture, but if you have an *inversion* fracture, as this picture shows beautifully [demonstrating], with a splitting up of the tibia, and you dress it as a Pott's fracture, see what happens! It is all displaced inward and your fragments will be up behind because it was split, and you have an evil result. When you know whether it is an *in*version or an *e*version fracture, you know at once whether or not your tibia has its internal portion carried off. That guides you as to your line of permanent fixation.

Here is a case of fracture with displacement of the astragalus and the malleolus: the skiagram was made with the gypsum case on. We freed that fragment and rotated it: it was turned out, and we displaced it inward and put in a single nail. We just cut a hole large enough to admit the drill. We have a drill with a soft base and a hard top. We put in the drill, and when it had the proper relationship, cut it off flush with the surface of the bone. Why take out the drill and put in a nail? Your drill is in and it is in right. By the smaller number of manipulations required there is less danger of contacting with the skin. Just cut the drill off with an ordinary automobile pliers and let it stay. That was the only incision it was necessary to make. Then we put in a second nail and fixed the tibial malleolus and dressed it inward. It is now two weeks since the operation was performed. When the fracture is united, we shall take out the stitch and simply put the leg back into the gypsum case and send her home. That tibial malleolus cannot get away: it has the drill in this relationship and it is dressed in that position, so that it cannot get away. We do not disturb the fibula at all. We made the reduction sufficiently inward. The interosseous ligament will unite, the tibial malleolus is in the proper relationship, and it is dressed in an adducted relationship.

Case XIV.—Here is a case of metastatic arthritis of the hip-joint, which developed a lipping condition, which has been described by the English surgeons. We went in and cleaned all that out and took off all the edges and put the head back into the acetabulum, and we have removed these impinging margins. We hope to get a serviceable limb out of it.

Case XV.—This is a case of bony ankylosis of the hip-joint.

See the enormous mass of bone that is involved in that ankylosis! I did not recognize him when he came in, nor did I know what was the matter with him, so perfectly does he walk. Look at the perfect function in the new hip-joint as the result of our operation, and it is only nine months since we operated!

Case XVI.—Guess what was the matter with this man! Which leg is it? That was a fracture in the trochanteric zone, and one of the kind that gives a good result. It is the kind that you see reported through the literature, and which they say was an intracapsular fracture. Intracapsular fractures do not give that kind of a result! You see he has not the slightest limp. He is sixty-eight years of age. That shows the result. Of course, that is nothing like an achievement, such as we have with our arthroplasties. That is what you should get if you put that class of cases in bed and keep them there for from ten to seventeen weeks. You will not get that if you keep them in bed seven weeks. You get just what you see in this picture [demonstrating]. That man was a doctor, and he stayed in bed six weeks. Then he began to walk around, but a pseudarthrosis developed up there, where he had not the slightest license to have a pseudarthrosis. Remember, you never have failure of union where the fracture is in cancellated tissue, except in the condyles of the humerus, at whose necks the bone is compact and thin. Understand, when I say "never," it is for teaching purposes. I always express it in very positive terms, because that represents the rule to which there are some exceptions for which there are special reasons. That is the only way to teach if you expect it to stick. That is exactly true with the exception. That doctor shows the exception.

Case XVII.—Here is a case of very bad bowlegs in an adult, in which we performed double fracture: the whole deformity occurred in just that zone [indicating]. To produce two square fractures in that man with the possibilities of non-union and displacement would be somewhat of a hazard, as would the aid of foreign bodies to keep them fixed. To make a division of the bone that will not permit of displacement, and to do it without hand-contacting, involves little or no hazard. We just went in here, elevated the periosteum on both sides, and did it with instruments that we never permitted our gloves to contact with, put in retractors, and then divided the bone clear through with our artist's chisel, which is a thin chisel that does not fracture. We split it through to the back, and we had exactly the same cut on the back that we had in front: when that was free we cut off the tibia that was out here. Never throw these ends out of contacting, but always keep the freed surfaces in contact for union. No foreign body was inserted. Then we dressed it with slight rotation and abduction. To obtain control of the limb after fracture, this support must go clear up onto the hip.

It is now two weeks and three days since the operation was performed, and the wound has not been dressed yet, but will be dressed in about another week. By that time we shall have a soft callus and be enabled to increase or diminish the bow just as much as we desire, after which we shall put on a permanent gypsum case, going clear up to the hip and including it. This plaster dressing will stay on for eight weeks, by which time bony union will have taken place without the danger of displacement or of non-union, such as might occur by any other method of fixation.

Case XVIII.—This patient had non-union of the tibia following a fracture. First we exposed the ends of the fragments and elevated the periosteum above and below. Then we took our saw and split the bone upward from the line of fracture for a distance of four inches, leaving a strip of bone from ½ to ⅝ inch in width. Then, from the lower fragment, we removed a strip of bone of the same width, but only two inches in length, and into the gutter left remaining we slid down the four-inch transplant from the upper fragment, after the inlay method of Albee. That is an instance where the transplantation is made from one and the same bone. The operation was performed seven weeks ago, and I think there is now pretty good bony union: it is too soon, however, for a transplant to remain wholly unsupported, so that we shall put on a firm gypsum case clear up to his thigh and then let him go home. He will not walk on it for twelve weeks from the time the transplant was inserted, no matter how solid the latter seems. See what a perfect position we have obtained! When about to perform all that work write over the page before you begin, "*You must not touch the hand to anything that touches the wound!*" And never touch that part of the instrument which touched the hand to the wound. It is fearfully hard to get accustomed to doing that after working in the abdomen, where you are accustomed to using the hands for everything. By this no-hand-contacting method, if a hematoma should form, it will not be exposed to saprophytic decomposition. If a hematoma should form, all you have to do is aspirate it.

Case XIX.—This patient had in his knee a metastatic arthritis with effusion, and we are endeavoring to determine where the primary infection came from. Remember, arthritis, or "rheumatism," or whatever you wish to call it, is always a metastatic infection: it does not arise from errors of diet, but secondary to a primary infection in some other portion of the body. In the acute varieties the commonest site for a primary focus of infection is the upper nares; next, the pharynx; thirdly, the tonsil; fourthly, the skin, especially a furuncle.* Wherever you have arthritis,—whether you call it "rheumatism" or arthritis does not matter,—or wherever you have "rheumatism" that begins with a chill, you always make up your mind that that patient will have one or more ankylosed joints at the end of the process (I am speaking, you understand, of acute "rheumatism," or acute rheumatic fever), and so you start out with that proposition—that the patient is going to have an ankylosis somewhere. With the salicylate treatment—which is the best treatment—a number of the joints will get well in two weeks or ten days, and finally one joint will be more painful and become more fixed, eventually undergoing ankylosis.

What is your obligation in these cases? From the very first day you should put these joints into the most favorable position in case of subsequent ankylosis. If you let the joint get into a bad position for a week or ten days you will never get it into shape because when you put on extension late in the acute inflammatory stage the pain is intolerable. If you put extension on the first day, the pain is relieved, and you may keep the hypodermic at home in the safe, where it should be.

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* Riedel (*Deutsch. med. Woch.*, January 21; 28, 1915) calls attention to the serious nature of metastasis from furuncles. He saw 54 instances of metastasis from a furuncle, carbuncle, or felon, in otherwise healthy individuals, with 13 deaths. The development is insidious and slow, taking weeks, months, or even years. In 14 patients the metastases were in bones, and 8 of these were children.

Remember, "rheumatism" that begins with a chill represents the virulent type of metastatic arthritis: that is nothing new. When I was an intern in the Cook County Hospital, in 1879, Dr. Hollister made this statement *in re* the differential diagnosis between pyemia and rheumatism: "The patient that has arthritis without a chill has rheumatism. If you have a patient who has arthritis *with a chill*, that patient has pyemia." You see these old doctors learned from a clinical standpoint what conditions were. I was speaking, of course, of surgical cases, and his judgment was correct and can be applied to your practice every day as you go along.

The management of these cases the first day the patient calls a doctor is to put on an extension-apparatus, which immediately relieves the pain when the joints are involved. The second indication is to inject the larger joints—such as the hip, knee, or ankle—with a solution of formalin in glycerin, 1½ or 2 per cent. strength. If the infection is acute, use the 1½ per cent. strength, for that produces a polynuclear leukocytic response in the joint, and a constitutional polynuclear leukocytosis—both rendering the fluid of the joint a poor culture-medium for the bacteria that may come in. There is no other medicament we know of—barring turpentine—that gives such a degree of polynuclear leukocytosis either in the joint or locally.

We do not know how to use Venice turpentine to inject it into the joint. Remember, thirty-one years ago in Liverpool there was a doctor who treated rheumatism by injections of turpentine into the loin. This developed a phlegmon, and finally, on the fifth day, when the abscess was good and large and ripe,—not a bacterial but a chemical abscess,—he opened it and let the pus out and cured his case of rheumatism in a large percentage of the cases. What did he do? He produced polynuclear constitutional leukocytosis by the local injection, because that pus he let out which the turpentine produced is practically 100 per cent. polymorphs. You can demonstrate it any day you wish by injecting some turpentine beneath the skin of a dog and noting how the leukocyte count runs up. It means a constitutional response against microbic invasion.

Case XX.—This patient had displacement of the semilunar cartilage with traumatic synovitis. At operation, four weeks ago, we removed the semilunar cartilage.

Case XXI.—This patient is a baseball player: in running to his base his knee shot out and he split his semilunar cartilage. In 1912 we ablated the semilunar cartilage, and he is back on his job as a baseball player. You may see the almost normal range of flexion and extension that is present now, three years after operation.

Case XXII.—This was a peculiar case, and the history was misleading as to the final result from a pathologic standpoint. I shall request the patient—a physician—to tell you what happened.

PATIENT: A year, or rather ten months, ago I had my hand up on a fence to make a leap over the fence, when I injured that knee. I had excruciating pain for a half-hour or so. When I got up on top of the fence I discovered that I could not straighten the leg more than to that degree [indicating], but within an hour or so I could straighten it. It never locked except that one time. If I should stand on that leg any length of time,—fifteen or twenty minutes,—I would have severe pain and severe burning under the patella—not exactly an acute pain, but a boring pain. The knee never swelled very much.

DR. MURPHY: This sketch shows what happened. In getting on the fence he split his internal semilunar cartilage for three-fifths of the entire circumference—just split it as clean cut as you could split it with a scalpel. When it split, half of it went across the joint and the other half remained attached to the condyle and stayed there the rest of the time, and therefore the knee never locked again. The whole time the patient walked he was pressing upon that semilunar cartilage, which gave him that boring pain. You see the history was atypic. There was a strip of cartilage spread right across the joint in that position [indicating]. Five weeks ago tomorrow we took out the entire semilunar cartilage and he has quite a little motion now. That stiffness is from his fibrous arthritis, the result of his traumatic synovitis: it will eventually wholly disappear, and the patient should soon be able to flex his leg to a right angle.

Case XXIII.—This patient represents another class of cases: here is where we got our eyes opened, and we are still frightened about it. We are building a new hospital here, and the old building was being razed. Thirty years ago, in that old building of the hospital, the erysipelas cases were kept: we have not had a case of erysipelas in that building in thirty years. Those were the days when we had that creeping type of erysipelas which was so common. This patient was operated upon the day they were tearing out that building. There was some dust, which we had no particular reason to fear, as there is always dust in Chicago. After the operation he developed the typic creeping erysipelas. The patient operated upon the next day developed exactly the same type of infection. A patient on the fourth floor—not on the same floor with this patient—developed it in her nose. A patient on the first floor, with a little scab on his shin, developed it on his leg. A patient on one of the other services operated upon in the other room developed it, and a patient in one of the other services who had a scar developed it in the scar. All these cases developed in two days, and on all four floors of the hospital. May be we were not frightened! They all recovered.

This patient suffered most from the erysipelatous infection. We performed arthroplasty upon his knee for bony ankylosis. The flaps have lived, and there is now perfect motion of the patella, which is the first portion of the knee we try to move after arthroplasty. Notwithstanding the creeping erysipelas he is going to have a good result. The other patient went clear through the course and had a fever of 103° to 105° for eleven days. I remember when I was an intern we were wont to say: "The patient is fine: tomorrow will be the eleventh day, and the fever will go down." I have not seen a case of creeping erysipelas in twenty years.

There is but one similar situation that I can find in the literature, and that occurred in the smallpox hospital in Vienna. For seven years they had not had a patient in the smallpox hospital, and when they were razing the old building many of the workmen and many of the people who lived in the immediate neighborhood developed smallpox years after the last patient was in the hospital, showing how long these microörganisms can live in a dry, protected spot.

Case XXIV.—This is a typic case of tuberculosis of the knee in an adult. Do not treat tuberculosis of the knee in an adult on the expectant plan, for it has no value and never effects a cure. Make a resection and make a resection *at once*. Do not waste time trying to get the lesion to heal by all sorts of methods of fixation, but perform resection. This is his first appearance in a wheel-chair since the operation. There is no hematoma. He has bony union, and he has bony union because we have devised a better method of performing resection of the knee than we had formerly.

In making a resection of the knee-joint we formerly cut both bones straight across; then we tried holding them together with magnesium splints, magnesium plates, and all that sort of thing, and the result was bad, for in the presence of tuberculosis no foreign body acts well. What do we do now? We take the Gigli saw or artist's chisel and, following the convexity of the curve of the lower end of the femur, "slice off" the articular surface from behind forward; with the same instrument we "slice off" the articular surface of the tibia, but in a concave manner. The resulting convexity of the femur fits into the prepared concavity of the tibia, and fits at any angle, so that the bone-ends are always in apposition and always contacting. When the bone-ends are cut straight across, on the other hand, their greater area does not contact, and non-union frequently results. This is but a little point in improved technic, but one of enormous value to the patient. In addition, the leg should never be set in full extension, but always slightly flexed, in order to prevent limping. Any man who has had experience with resection for tuberculosis can tell why this patient is leaving hospital at the end of six weeks:

in two weeks more he will have a good, firm limb, and will be back into commission again.

Case XXV.—This is an arthroplasty of the knee. She had originally tuberculosis, was operated upon, and the whole patella or a portion of it was taken out: as you see by the skiagram, the patella is gone. We went in first six months ago and elevated the quadriceps tendon and chiseled out a piece of bone to which the quadriceps tendon was attached. Here was a fibrous elongation from the ligamentum patellæ which we elevated. We put in a fascia-and-fat flap between the bony patella and the tendon to give us a connection between the quadriceps muscle and the ligamentum patellæ. Six months later she came back to us and we inserted the flaps to relieve her from the bony ankylosis which she had. Those were the original steps. It is only four weeks since we performed the operation. That is the first one of that type we have had. You see that was the old scar. We did not promise a good result, but the young lady was determined to take a chance in order to get a movable joint. We would not do it if that were a man: we would do it only on a woman, because women will work so many more hours and put in so many more units of energy in order to get a result.

I recall a patient I had from North Dakota—a woman who admitted to being forty-five years of age. She wrote in saying that she had an ankylosis of the hip and wanted me to operate upon it. I wrote back and said that at her age, and as she was not having much discomfort, I thought she had better not have an operation. In reply I received one of the warmest epistles I ever had in my life, to the effect that she was not an old woman, and if I performed these operations, I had no right to deny her the privilege. Before I had time to answer it she was here. We performed the operation, and five weeks after the operation she could stand on the floor on the good leg and kick the knob of the door with the operated one. She went right straight along and developed a perfectly movable joint. I like these cases that come in with that type of determination, but these are not the only ones that should be operated upon. We had a little girl from Ohio. She came in here, and if you looked at her she would yell. She had an inflammatory condition in her hip before the ankylosis occurred. We operated upon her, and when I would come into the room it was one continual cry. I made up my mind that she would not do the exercise that was necessary. She went home, and the last picture I got from her she had her foot up on a step. That showed that she did get to work on it at last, but I did not feel that we would get a good result because she would not work while here.

Case XXVI.—This is a very interesting case, and one in which I came near making a mistake. She told the following story: She would be walking, when suddenly her knee would slip out, usually causing pain. I asked her the question, "Did you go down from the pain?" She replied, "No! It did not pain me until after I had fallen down." That very statement saved me from an error. *It did not pain her until after she had fallen down.* When they have a movable cartilage, they go down from the pain caused by the pinching of the cartilage. Upon one occasion, while examining the patient, after I had her attention fully distracted, I worked the leg out to the table and then suddenly dropped it, and I luxated the patella out onto the side of the knee. Before I examined her I suspected from the story that she had a recurrent external luxation of the patella. She had a movable cartilage under the patella, which her doctor had recognized, but she had a recurrent external luxation of the patella. If I merely took out the cartilage she would continue having the same trouble as before. We took out the movable cartilage—which was as large as a filbert—and then performed the operation of plication or imbrication of the fibrous capsule. We split the fibrous capsule through the synovial membrane, took out the loose cartilage, sewed up the synovial membrane, and then overlapped the fibrous capsule over this. That operation was performed two weeks and five days ago: the stitches have been removed, and she has not a particle of effusion in her joint because we never touched the joint or put anything into it. You know how long it took us to learn not to touch the peritoneum with sponges—a quarter of a century. In the knee do not put in sponges or an instrument except to take out the foreign body, and then get away as quickly as possible: do not keep mopping it or touching it, for if you do you will have an effusion in the joint.

Case XXVII.—This is another class of cases in which one has great difficulty. In this skiagram of the shoulder you see a fracture of the anatomic neck and a luxation of the head out of the glenoid cavity. This other skiagram shows a spiral fracture of the humerus. This was an automobile accident. There was no way of putting that head back by any method of manipulation. We waited until the fifteenth day,—until the proper inflammatory coffer-damming reaction had taken place,—and then made an incision here just anterior to the fibers of the deltoid muscle, retracted the margins of the wound, exposed the head, and freed it. After grasping the head with a volsella forceps, and with the aid of a skid, we forced it back into the glenoid cavity and put in a single screw from below upward and then closed the wound. You see what perfect alinement there is. We did not operate upon the spiral fracture of the shaft at the same time because conscience makes cowards of us all, and we feared infecting the upper operative wound with saprophytic or other organisms.

Two weeks after the first operation we went down and exposed the spiral fracture of the shaft, freed the fragments, and put them in close apposition with phosphor-bronze wire: we did not put in a plate. From a distance you can scarcely see where the fracture was, so perfect is the alinement. Here is the site of the musculospiral nerve [indicating]: you can see that it has not been interfered with. It is now six weeks since the operation was performed, and we are just beginning to put the limb through motion. We shall put on a light dressing and have him begin using the limb every day.

Case XXVIII.—This was a nasty case and tells another story. When you look at that skiagram you would say it shows a Colles's fracture. But it is not a Colles's fracture. Why? Because there is a *volar* displacement of the *distal* fragment, which displacement is the sequence of trauma applied to the *dorsum*. That is the only mechanism by which volar displacement could have occurred, so that from a description of the accident you know that it could not be a Colles's fracture. Had she fallen upon the *extended* hand (*volar* pressure), the *distal* fragment would have been displaced to the *dorsum*, and a true Colles's fracture would have resulted. *Colles's fracture is* ALWAYS *the result of a* VOLAR *vulnerating force!*

In this patient's case both radius and ulna were fractured and displaced toward the volar aspect: so close to the wrist-joint was the fracture that we could have no control of the fragments. Now as to the reduction—we could not reduce it manually, but thirteen days after the injury performed extra-articular nailing of both bones. An incision was made over each fragment, just large enough to admit a nail. The fragments were adjusted in their proper relationship, and the nail entered each distal fragment beyond the limits of the synovial capsule, and was then driven through into the middle of each proximal fragment. With such alinement and absolute fixation you may rest assured that the position is going to be good, and that the hand is going to be serviceable.

Here is an ancient fracture of the right hand of the Colles's type: it occurred in January, 1915. As you see by the skiagram, there is the fork-handle deformity from displacement of the distal fragment onto the dorsum, with resulting impairment in the use of the hand. If the reduction of a Colles's fracture has been complete, you have merely to put on a posterior wire-gauze splint and you will get a good result. But the difficulty is that of reduction. The fracture-line is either transverse or a split longitudinally upward, and the fragments usually become impacted. The deformity carries with it an alteration in the angle that exists between the inferior articular surface of the radius and the shaft: in place of tipping slightly forward this articular surface is tipped backward to greater or less extent.

The common method of reduction is to pull upon the hand in this manner [demonstrating], but no matter how much you pull you cannot reduce that kind of deformity by any type of traction that you make on the hand, nor can you reduce it by dressing it forward. First you must *unlock* the distal fragment by putting the distal thumb on the distal fragment and the proximal thumb on top of the distal thumb; then by hyperextension increase the deformity until the hand forms a right angle with the dorsum of the forearm, then flex and adduct to the ulnar side. After reduction is effected all you need do is put on a strip of plaster-of-Paris covering three-fifths of the circumference on the back and just put the forearm in a sling. If the patient goes home and walks the floor that night, reduction has not been made. If your reduction is perfect, the patient has practically no pain from that day until the fracture is healed, so that in persistence of pain you have a good guide to the fact that reduction has not been effected, and further attempts at reduction should be made. After reduction has been effected it does not matter whether you use Orton's splint, Jones's splint, or Bond's splint, for the fracture will get well and remain well, and the patient will have no pain, and ultimately attain a good result.

Case XXIX.—This was a case of ankylosis of the jaw. One week ago we removed the head of the mandible and interposed a flap of temporal fascia and fat. Owing to the short time since operation we have not attempted any passive motion of the mandible.

Case XXX.—This patient has been unable to open and close his mouth for eleven years, having been fed during that time through the opening afforded by the extraction of a tooth. It is now twenty-four days since we performed resection of the neck of the mandible with interposition of a flap, as in the preceding case. The scar will be scarcely visible, since for the most part it is buried in the hairy scalp.

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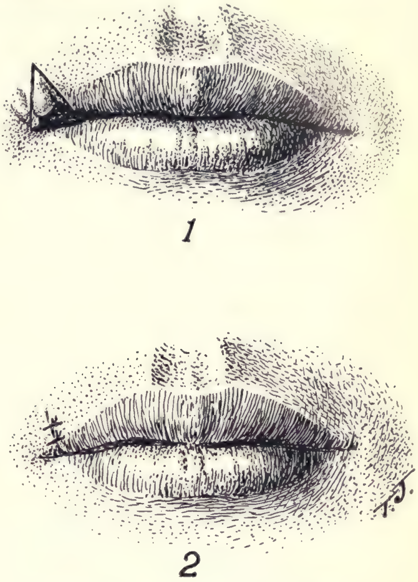

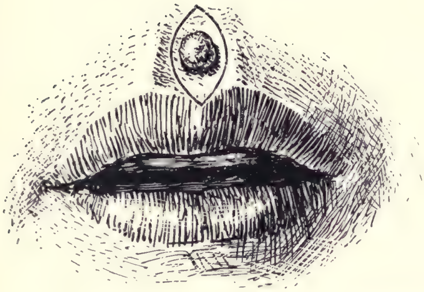

Fig. 184.—Papilloma in philtrum of upper lip, showing elliptic incision outlined for its removal.

Fig. 185.—*1*, Defect at angle of mouth, showing angular incision for removal of a wedge-shaped area; *2*, shows approximation of edges of wound

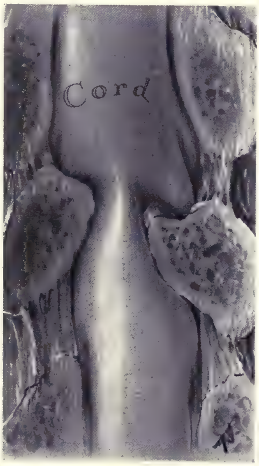

Fig. 186.—Operative exposure of spinal cord compressed by fracture of a posterior vertebral arch with displacement.

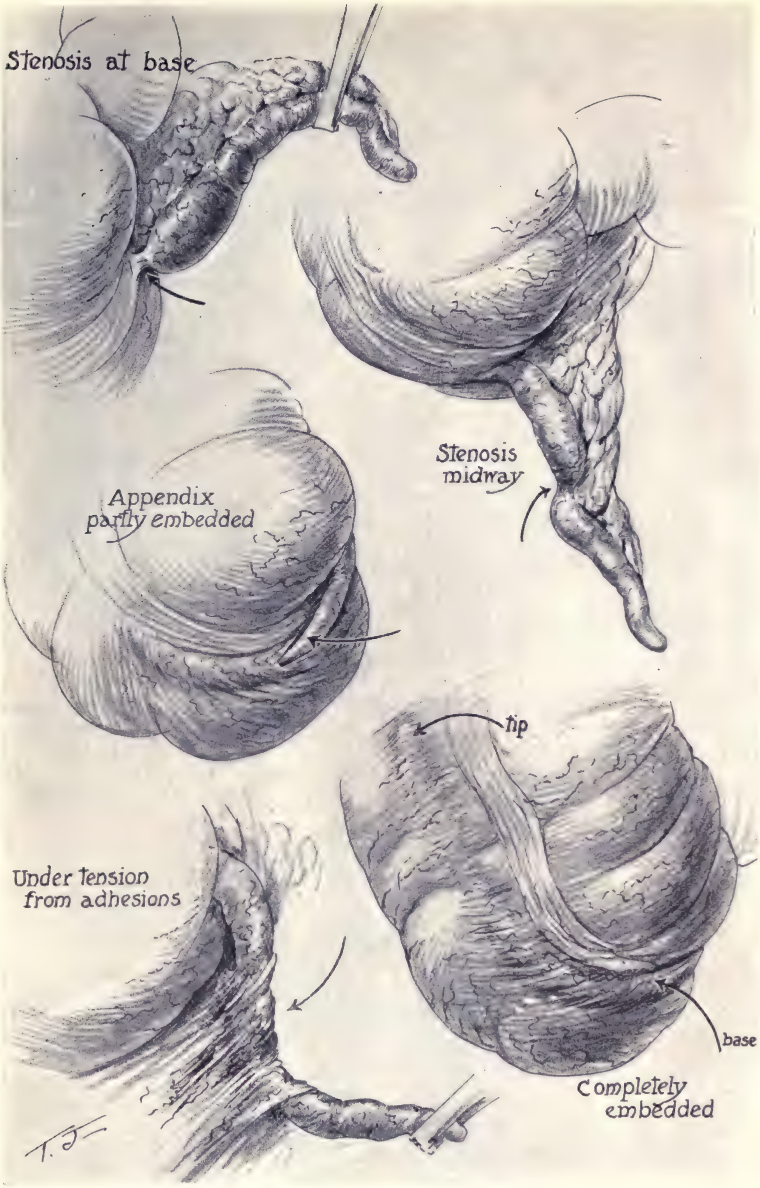

Fig. 187.—Types of appendices removed by Dr. Murphy on various occasions. The effect upon the organ of stenosis, whether at base or midway, is obvious: such a stenosis, by preventing drainage of appendix, encourages distention and hastens perforation. The same effect obtains in the organ shown below and to left, plus interference with free mobility of cecum. The remaining two illustrations show the necessity of *exposing the appendix throughout its entire length* before amputation, lest an imbedded portion of the organ should be left remaining behind. The sketch below and to right shows how an appendix may be mistakenly considered absent. Peritonitic symptoms and signs from an organ so situated (retroperitoneal) should be expected late in the course of an attack of acute appendicitis, if at all.

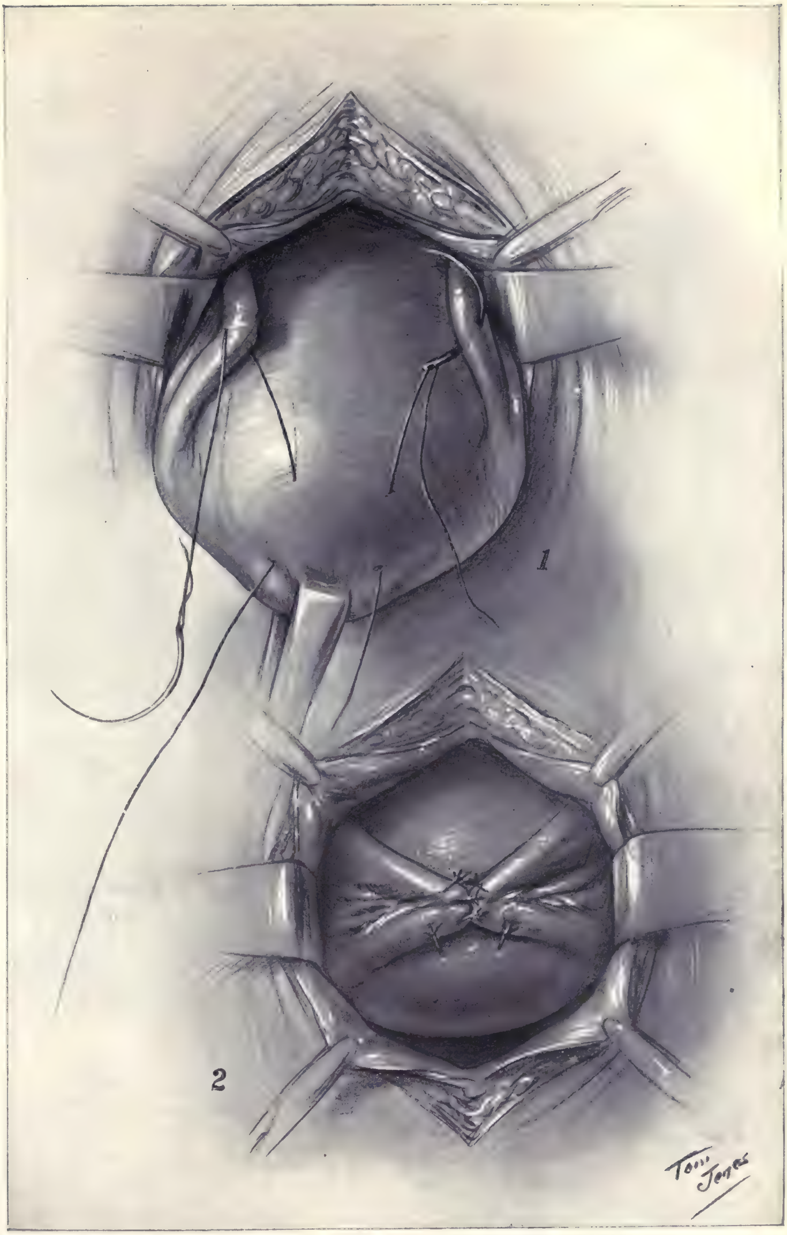

Fig. 188.—Dr. Murphy's technic of elevating uterus by shortening round ligaments across posterior surface of organ: *1*, On each side needle enters uterus just below fundus, emerges, and transfixes round ligament; *2*, sutures tied so as to approximate reduplicated ligaments. The union is secured further by four interrupted stitches. (Compare with Fig. 6, Vol. V, February, 1916, p. 21.)

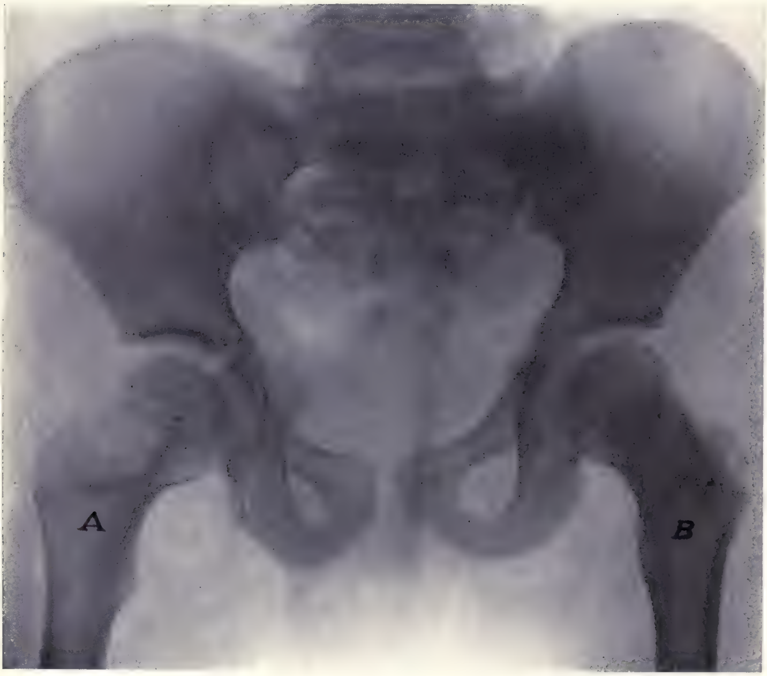

Fig. 189.—Preoperative skiagram showing tuberculosis of neck of right femur at *A*.

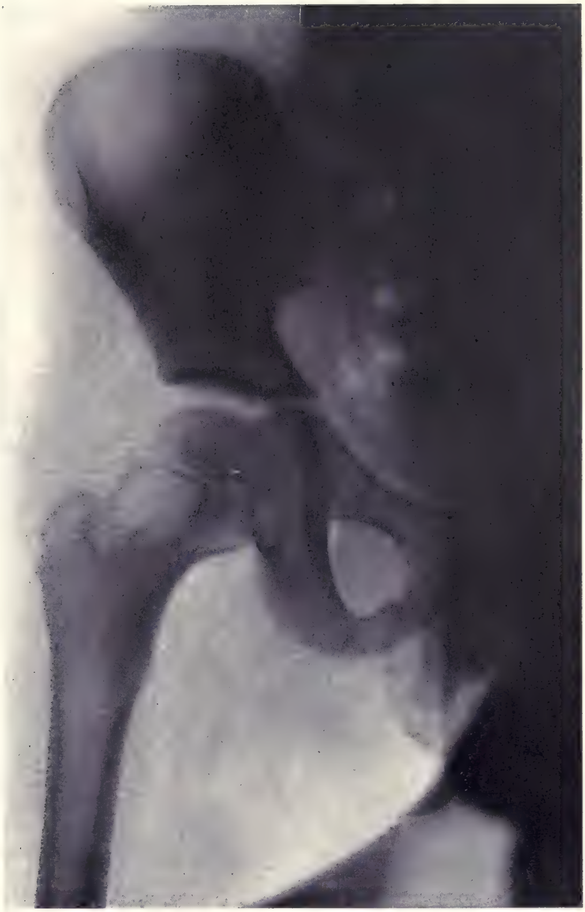

Fig. 190.—Preoperative skiagram showing appearance of tuberculosis of neck of right femur in lateral view.

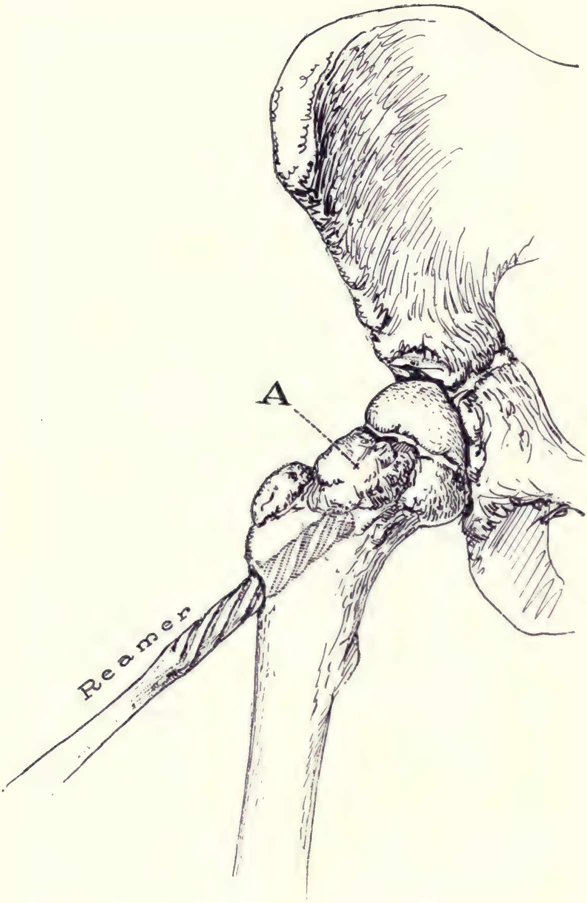

Fig. 191.—Dr. Murphy's method of obtaining operative access to a tuberculous focus in such a situation as is shown in preceding picture. After exposure of greater trochanter a reamer is entered through its base and passed up in the long axis of the femoral neck until it enters the cavity at *A*.

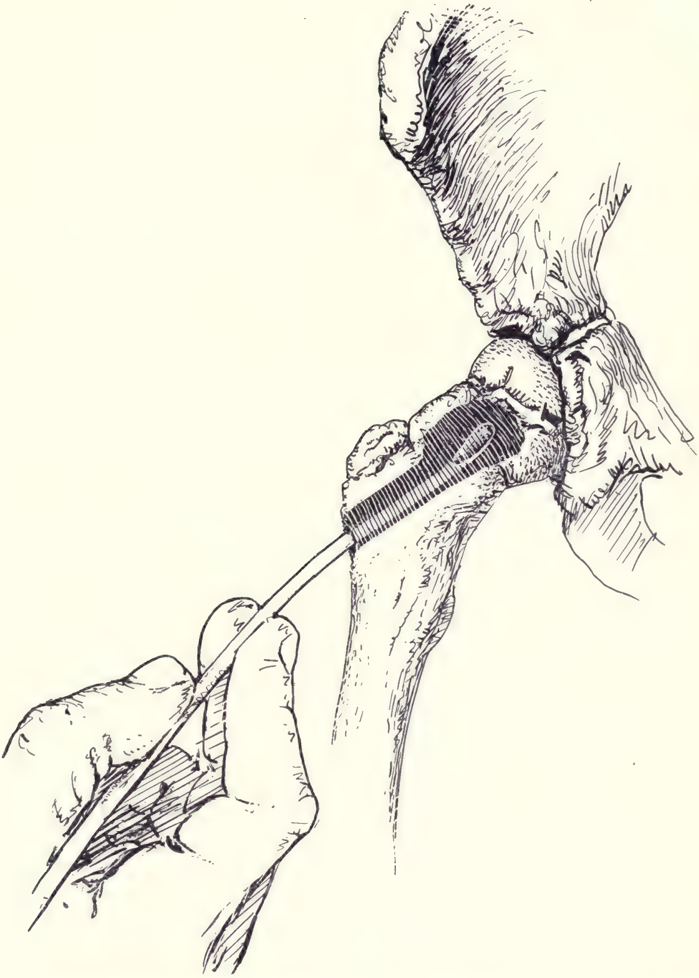

Fig. 192.—A flexible curet is substituted for the reamer and the cavity scraped out. The resulting space was filled with iodoform and the operative incision was then closed. Note how by this method the integrity of the upper end of the femur is maintained as a supporting structure, contrasted with the sacrifice of bone necessary in formal resection.

A SERIES OF SKETCHES SHOWING A METHOD OF TREATING ANKYLOSIS OF THE FINGERS BY GRAFTS OF COSTAL CARTILAGE

(Modified from Bailleul, *Medical Review*, June, 1916, 223)

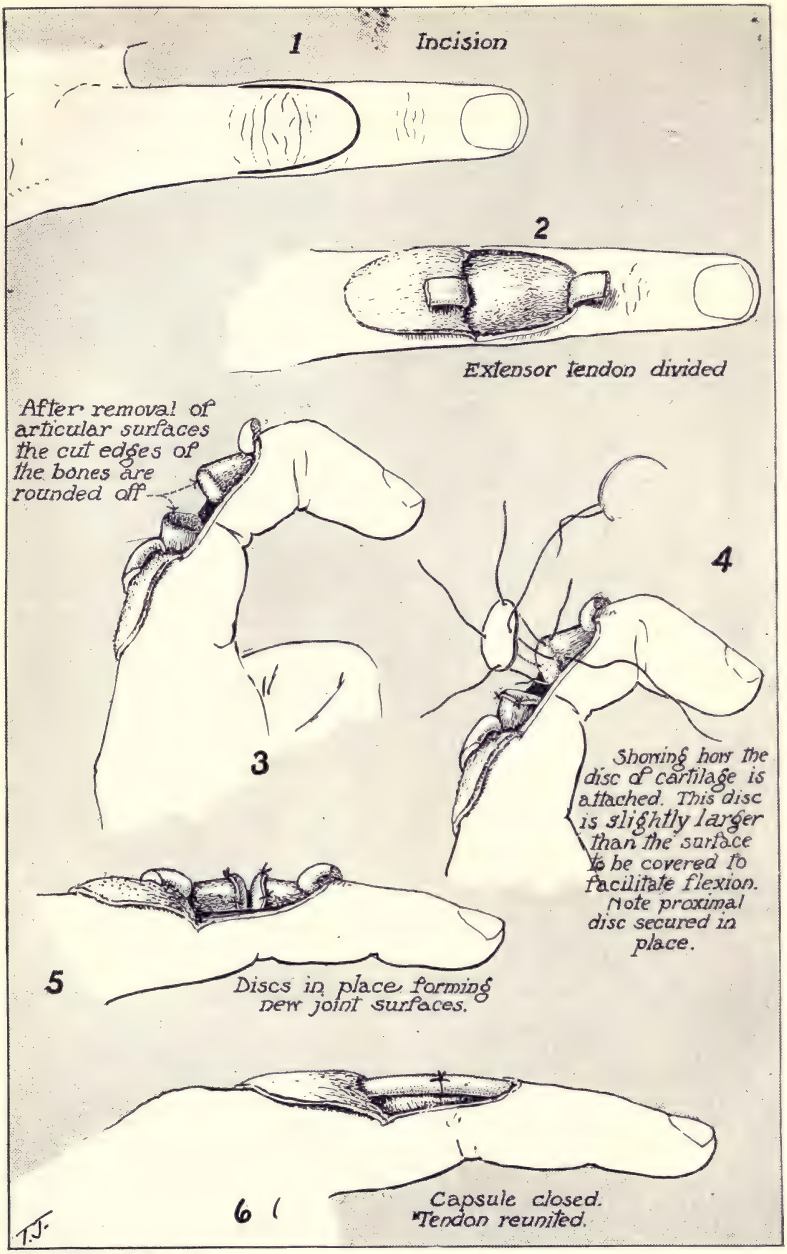
1
Incision
2
Extensor tendon divided
After removal of articular surfaces the cut edges of the bones are rounded off
3
4
Showing how the disc of cartilage is attached. This disc is slightly larger than the surface to be covered to facilitate flexion. Note proximal disc secured in place.
5
Discs in place forming new joint surfaces.
6
Capsule closed. Tendon reunited.
T.J.

Fig. 193.—The steps of the operation are made clear by the sketches and accompanying legends. First the stiffened joint is resected. Then 1.5 cm. of the ninth costal cartilage is taken: from this slices are cut 1.5 mm. thick, carefully preserving perichondrium, which greatly assists in securing grafts in position.

The joint is exposed by V-shaped flap, convexity of V extending to about middle of phalanx, distal to affected articulation (1). This incision avoids scar over joint and gives free access to the parts.

Expose extensor tendon, free from capsule of joint, and divide (2).

Incise capsule transversely and retract upward and downward to expose joint.

Remove articular surfaces with pliers and remove edges of resulting flat surfaces, the concavoconvex articulation avoring wide movement with stability (3).

Place four sutures at cardinal points of disc (4).

A fine Hagedorn needle with No. 000 catgut is first passed through cuff of periosteum and joint-capsule on palmar surface and then through margin of disc. Insert other sutures before tying this suture. Apply other disc (5).

Suture capsule of joint with No. 00 catgut. Suture extensor tendon (6). Suture flap.

"The earlier cases have been under observation two months and have shown not only no tendency to recurrence of ankylosis, but progressive improvement in the functional value of the finger."

CARCINOMA OF MUCOUS MEMBRANE OF CHEEK—ABLATION THROUGH KOCHER INCISION

Summary: Clinical history of patient; comments—mode of development of the lesion; outlook after operation not promising; responsibility for cancer problem rests on shoulders of medical profession; operation—ablation of cancer and portion of tongue through Kocher's incision.

CLINICAL HISTORY OF PATIENT

A MALE, fifty-two years of age, was admitted to Mercy Hospital October 17, 1915. The family and past histories are negative.

The chief complaint is a growth in the mouth. On September 10, 1915, the patient noticed that his throat felt raw, and in three or four days it was very sore. He says that he also had a cold. He went to a doctor, who gave him a gargle and swabbed his throat. The throat bled from the onset of the rawness whenever he tried to clear it by hacking. The pain kept getting worse, and he could not eat any solid food.

About October 1st the patient noticed a mass at the angle of the left side of the mandible, inside the mouth, in front of the anterior pillar of the left tonsil: this mass rapidly enlarged until now it is the size of a pigeon's egg. It has encroached on the left lateral surface of the tongue, and there is an oozing of blood from it nearly all the time—particularly at night. He had a section made October 11th which was reported to be carcinoma. He has lost eight pounds in weight in a month.

COMMENTS

DR. MURPHY (October 15, 1915): The patient states that the lesion has been present only four to six weeks: we do not accept that statement at all. That ulcer has been present probably four or five months—if not longer. It is in a position where you have great traction. He started first to have the local irritation. He had the local irritation probably existing there for years, until finally the epithelial cells overcame the resistance of the connective-tissue cells and they penetrated into the connective tissue beyond their limiting basement membrane: that is what makes the carcinoma. You cannot differentiate the cancer-cell from the normal epithelial cells of the same type. The only way you differentiate them is because the epithelial cells have penetrated the basement membrane and gone on a rampage of destruction into the connective tissue of the neighborhood: in other words, they have penetrated the basement membrane, which was the normal limiting membrane, and then comes the destruction.

For this man I do not think an operation is going to add materially to his comfort or prolong his life: that is a very difficult statement to make to the patient. There is another element about it. The carcinomata that begin in the mucous membrane of the mouth are the most malignant type of carcinomata except the melanotic type. A larger percentage dies from local recurrence or from constitutional recurrence than in any other type except the melanotic type: that is one reason for not advising operation. You have to say to the patient that the time at which his life is going to be saved is already past, and that brings on you an obligation. When you saw that man the first day you should have made a diagnosis by getting a specimen and examining it. *Do not guess on his life, for his life is not yours!* It is your sacred obligation to save that life and to do it while it can be saved: if you neglect to do that, you are guilty of a crime of neglect that should be punished.

This cancer problem is a terrible one. In the thirty-five years I have been practising surgery I can say that the condition has not improved 10 per cent.: they are coming in just as bad and just as long neglected as they did thirty-five years ago. It is a professional responsibility. The people go to the doctor much earlier than they did formerly and they ask his advice. You may say they do not take his advice: I question that statement very much in its literal meaning. The reason they do not take the doctor's advice is because they have a feeling from something he does or says that he does not know what he is talking about, and sometimes they are right, but if he has the type of conviction, and if he goes at it in a systematic and definite way, the patient is always convinced if the doctor is properly convinced. That is the reason you cannot throw the responsibility onto the people. We must accept the responsibility and we must take the opprobrium that the neglect carries with it.

OPERATION

Dr. Murphy (October 18, 1915): This is not a carcinoma of the tongue: it is a carcinoma of the anterior pillar of the fauces extending out onto the periosteum. Some of you were here the other day when we considered this case and particularly advised this man not to have it done. He wants it done. He says he cannot stand the pain, and that he wants a little prolongation of life. They all recur: if we get them early, we are going to have better results. No one knows how early it is after the primary invasion of the basement membrane by the erratic epithelial cells that those cells reach and invade the nearest lymph-node.

This incision will interfere with the labial branch of the motor nerve of his face. . . . There is the tonsil: here is an infected lymph-node at the apex of the submaxillary salivary gland. It has done fairly well in holding the infective material: is it the seat of mixed infection, or purely carcinomatous metastases? It looks as though it were breaking down. Of the cervical lymph-nodes, this one is most frequently infected. There is the common facial vein coming right across the field.

We are now down upon the digastric muscle and have exposed the tongue. Note the infiltration: this infection is way back at the base of the tongue. . . . Now we have enucleated the neoplasm almost up to the floor of the mouth, showing the fixation of the process above. You see my finger is in the mouth on the pillar of his fauces: I want to get this tumor detached from the inside. It is rather easy to get it free from the jaw, but it is not so easy to get it free from the soft parts. . . . Now it is showing up pretty nicely: there is the capsule, here are the under surface of the tumor and the under surface of the tongue. Now I shall let the tip of his tongue come out: now I am way behind the tumor and you see I am getting beyond the margin of the tumor nicely. . . . It seemed like a lot of grubbing when we started in, but I had a definite purpose in view. This is not a cancer of the tongue originally: it is a cancer that came to the tongue from the mucous membrane of the cheek. It is only a question of time until all these tissues will become involved.

We shall close up that opening in the tongue as we come up. That is what we did in the last case that healed up so nicely. That covers my tongue clear around. Now look! I am going to sew the margin of the tongue to the pillar of the pharynx.

Recapitulation.—Let the record show that the granuloma extended up from the margin of the tongue down to the location of the submaxillary lymph-node and the submaxillary salivary gland; this was enucleated up from below; then we freed all the tissues from the inner side of the mandible and exposed the attachments of the neoplasm to the tongue; then the under portion of the tongue was amputated so as to remove all the tongue that was close to the lesion of the mucosa which extended from the mandible to the margin of the tongue, having been primarily a cheek mucous membrane carcinoma and not a lingual carcinoma, which accounts for our leaving so much of the tongue; a drain was inserted.

Pathologic Report (*Dr. Baugher*).—Piece of tissue from mucous membrane of mouth, 3.5 x 2 cm. No necrotic areas. Squamous-cell cancer, rapidly growing.

GUN-SHOT FRACTURE OF MAXILLA—REDUCTION, PLATING, WIRING

Summary: Clinical history of patient; comments—description of injuries; operation—wiring of teeth—splinting by lead plate.

CLINICAL HISTORY OF PATIENT

A FEMALE, twenty-eight years of age, was admitted to Mercy Hospital September 17, 1915.

Two weeks before admission—on September 4th—the patient was shot at at close range with a 38-caliber revolver and was hit four times by the leaden bullets. The first bullet entered the right supramaxillary region, fracturing teeth and entering the anterior portion of the roof of the mouth. The second bullet entered the posterior surface of the right arm; the third bullet entered just above the right iliac crest, passing through skin and superficial fascia only; the fourth bullet passed through the skin and superficial fascia of the right side about the level of the sixth rib.

The patient was immediately taken to hospital, where the wounds were dressed and the mouth packed. For the next three days there was considerable hemorrhage from nose and mouth, and from the third day to the present time there has been a purulent discharge from the mouth. There is now hemorrhage from the mouth on the least exertion. She has had no chills. On the third day after the accident she had a fever of 101° F., but there has been no fever since.

COMMENTS

DR. MURPHY (September 20, 1915): This woman was shot by her husband again and again and still lives to tell about it. The first bullet passed in here just below the eyeball: it did not hit the eyeball, but passed below it and fractured the maxilla.

Today I must reduce the fracture and endeavor to fix it back into position. Sepsis will not occur, for the mouth-tissues resist sepsis. What I want to do is put a lead plate in to hold that fragment up and secure it in front and behind. She has a number of bullet wounds in other positions in the body, but none of them is serious. She was fortunate in that the first bullet struck low enough to escape injuring the eye.

OPERATION

This is phosphor-bronze wire I am using to make a splint of. This goes behind the wisdom tooth; then I am going through again and coming out in front of the wisdom tooth so as to throw the wire around the wisdom tooth. The other will have to come up on the side. . . . We shall now tie the back wire. We shall have succeeded, I think, in getting this into very good shape, if we can retain that alveolar process up in position. This wire is not elastic, but after it is settled in position it will give the patient little or no trouble. Now you can see that I have that as an inner plate on the alveolar process, and it holds it up in position: it is attached to the wisdom tooth behind. See how nicely that holds it up in position—just a lead plate doubled and put on the outside! It is anchored behind and anchored in front, but the pressure against it is against its convexity, which gives it its strength. That is all it needs. She will have bony union of the alveolar process and she will have fairly good conformation. Afterward the plate will have to be removed.

Postscript.—The patient made an uneventful recovery. There was complete primary union. When she left hospital three weeks after operation the jaw was in splendid condition.

OSTEOMYELITIS OF MALAR BONE—INCISION AND CURETTAGE

Summary: Clinical history of patient; comments—bones to which tooth-infections are liable to metastasize; character of infections from mouth; significance of a phlegmon; sequela of an infection in this situation; operation—dissection down to center of abscess; granules resembling those of actinomycosis encountered.

CLINICAL HISTORY OF PATIENT

A MALE, thirty-seven years of age, by occupation a cooper, was admitted to Mercy Hospital October 4, 1915. The family and past histories are negative.

The chief complaint is a swelling on the left side of the face, so that the patient is unable to open his left eye or his mouth wider than to admit a lead-pencil.

Ten weeks ago the patient noticed a small, hard mass under the skin just back of the zygoma on the left side. This gradually enlarged for four weeks, when it became as large as a tumbler, shutting the left eye and locking the jaw. Then for the first time he had chills and fever. On August 28, 1915, the mass was opened and a drain put in: the wound was then dressed daily. On September 7th he went to a hospital where the wound was lanced and probed five times. He left the hospital September 28th, and the wound was dressed daily at home until his admission to this hospital on October 4th.

In April, 1915, the patient had a slight attack of pneumonia and pleurisy and was in bed four days. For the past three years he has had a bad molar tooth in the upper left side, which is decayed down to the gum.

Examination by Dr. Murphy (October 5, 1915).—He has a necrosis of the malar bone which is quite extensive, probably involving the entire bone. The malar bone will have to be excised, and care must be taken not to injure the orbicularis palpebrarum in doing the work. A culture was made from the pus and showed Gram-positive cocci.

COMMENTS

Dr. Murphy (October 8, 1915): What is the matter with him?

Intern: An osteomyelitis of the malar bone.

If he had a metastatic osteomyelitis from an infection of his tooth, it would be much less liable to appear in his malar bone than it would be to appear in the tibia, the femur, the humerus, or the bones of the forearm; but he had a direct transmission of the infection into this zone as a result of the disease and had some caries there and probably some necrosis. He comes in now with an inability to get the mouth open. We should like to pull that tooth, but it is impossible to get in there as it is now. We must endeavor to clean out the inflammatory process in it and then endeavor to relieve the infection which is causing extensive tension on the mandible.

Now, then, we have this man in an acute inflammatory stage, and in this acute inflammatory stage we must try to relieve the infiltration and edema, and when that subsides, see if we shall not be able to get some opening of the mouth: if not, some radical operation of the type previously described in the Clinics will have to be performed in order that we may be able to get in and extract the tooth. It is very desirable to extract the tooth first, if we were able to do it, but we cannot reach it in the present state of affairs, so that we shall have to drain away the inflammatory products first and wait until the swelling has subsided.

When infections occur from the mouth, there is often an enormous infiltration with a small quantity of pus. In mycelial infections—like the actinomycotic—you will sometimes have a wood-like induration 1½ to 2 or 3 inches in thickness. After you have cut down over the abscess sometimes you will get a little focus of pus—probably not larger than a filbert. How do you interpret that infiltration? As nature's effort to encapsulate and hold in the infected microörganisms. That is what a phlegmon is: that is what a mass around any inflammatory condition is. All that swelling that you see there is not your enemy:

it is your friend, and particularly the patient's friend. Were it not for the coffer-damming and infiltration that form around an infection it would rapidly pass into the circulation, and you would have a blood infection as a sequence. We were wont to say, "Encourage the infiltration, but remove the cause." The infiltration varies greatly with the different types of infection. Take the streptococcus variety—you have practically no local infiltration. Why? Because streptococci are not held *in loco*. That is why when a streptococcus infection takes place in the finger or in the hand or in some other place in the body it is within a few hours in the blood.

Now you can see from looking at this where the infection came from the zygoma and where the abscess has been opened. That is a nasty case, because as a sequence of this infection he will have a large amount of connective tissue, and it will be difficult, if not impossible, for him to get his jaws open, and it will be extremely difficult to perform a plastic operation for his relief.

OPERATION

In making my incision I must be very cautious, because if I am not I shall impair the motion of the orbicularis palpebrarum. . . . I am on the under surface of the wing of the sphenoid: if I am not careful I shall be in upon his dura. I am going in behind the zygoma to relieve this infection where it has accumulated. . . . I have taken off the margin of the zygoma: this will give me a chance to get in here and clean this out. . . . Now I am onto the malar bone. I think I have the central cavity open. See the granulation tissue and the infiltration! Now I shall go into his mouth. There is a decidedly offensive odor from this pus. There are some yellow, suspicious-looking masses, reminding one of the actinomyces that are occasionally found in this relationship. There is one that is quite suspicious: it is about the exact size and shape of a granule from a typic actinomycotic infection. . . . I am now under the malar bone on this side. . . . There is another spot which looks mighty suspicious. See that yellow mass? That is the mass that looks so much like an actinomycosis. That may be just yellow, necrotic *brie* of an infection, but it is the shape, size, and color of an actinomycotic granule. We have not seen one of these in a long period of time. The first one observed in America was observed by us when we had our office on the west side.

Recapitulation.—Let the record show that there was an abscess behind the malar bone with a necrosis of the surface of the malar bone and with a pocket extending all around the under surface of the zygoma; the pus contained little yellow masses which very closely resembled actinomycotic granules.

Postscript (*November 20, 1915*).—This man had an osteomyelitis of the malar bone and zygoma which just kept that sinus open. It is a mycelial infection, but not an actinomycotic. The wound is to be curetted today.

SARCOMA OF MAXILLARY ANTRUM—EXCISION OF MAXILLA

Summary: Clinical history of patient; comments—review of history and consideration of operative outlook; operation—preliminary ligation of external carotid artery; excision of maxilla.

CLINICAL HISTORY OF PATIENT

A FEMALE, fifty-eight years of age, was admitted to Mercy Hospital January 7, 1916. The family history reveals no malignancy, but one brother died from pulmonary tuberculosis. When thirteen years of age the patient had diphtheria, followed by paralysis of the uvula which lasted two months. She has had catarrh of the head for twenty years. Her menstrual history is negative.

The chief complaint is a growth in the maxilla. Early in July, 1914, the patient had difficulty in breathing through the right nostril. There was some discharge through the nostril, but no pain. In November, 1914, she consulted a nose and throat specialist, who drilled a hole in the right maxillary antrum to relieve the breathing obstruction. Her right nostril began to discharge immediately and has continued to do so ever since. It was a watery, bloody, pus-like discharge. She states that she has had to have a covering for her pillow every night because of the discharge, which is about a dram and a half in amount.

Her condition continued about the same until June, 1915, when she consulted a nose and throat specialist for the discharge. He told her that she had a growth on the roof of the mouth, which was neither elevated nor rough, and she did not know that she had it. After her attention was called to it, she noticed that it was smoother at that spot than elsewhere in her mouth, and was about ½ inch in size. She had no pain. The tumor has grown in size, and at present is about one inch in diameter.

Ten days ago the right side of the face began to swell and she had severe pain in the right side of her face—so severe that she had to take morphin. The discharge did not increase in quantity.

Examination by Dr. Murphy (January 7, 1916).—All the right half of the maxilla is involved, and the tumor bulges way into the mouth. The eyeball is displaced forward. The tumor protrudes into and fills the nostril from the right side. She says that four months ago her mouth filled with blood for the first time and three weeks ago she had a severe nosebleed. It is not a promising case for operation.

COMMENTS

Dr. Murphy (January 10, 1916): That is a common story, and, you might add, the same, sad tale. She began to have her trouble in the fall of 1914. Finally, as the trouble became worse, she consulted a doctor, and the doctor interpreted the obstruction to the breathing as due to a turbinate bone, in place of making an actual examination of the condition. The turbinate bone was removed and the condition continued to increase in severity. The patient went through the winter of 1915, and finally along in June, 1915, she saw a nose and throat specialist, who told her that she had a neoplasm: she has gone from June, 1915, to January 10, 1916, without doing anything. Finally she comes in to me now, and with all my discouragement concerning her condition she wants an operation—and with no promise at all for the present or future she wants an operation very much more than I want to perform the operation. At the same time I feel it is a duty I owe her to give her a chance for her life. There are no lymph-node involvements that are recognizable, and the chances are that it is one of those tumors that began in the antrum, possibly as a sarcoma,—we hope as a sarcoma,—and involved all the maxilla until it reached this superlative stage. Her eyeball is pushed out of plumb. I have planned to excise the maxilla.

OPERATION

The first step is to expose and ligate the external carotid artery, so that we shall not get the bleeding that occurs in connection with this operation. I am making the incision for that artery parallel with the long axis of the folds of the neck. . . . There is the facial vein, as you see: I want to go in just above that. . . . There is the hypoglossal nerve, you see. This is one of the easiest arteries in the body to ligate because it is so easy to find.

See! there is the growth protruding into the nose and mouth! It extends clear beyond the midline. Now you will see how this incision is made: it comes down to the angle of the cheek. . . . Now we are coming back onto the posterior surface of the maxilla. . . . There is your masseter muscle. Now we must go up to the margin of the orbit so as to get onto this neoplasm that has pushed up, and so as to take out the nasal process of the maxilla. . . . Now I am going back in the direction of the zygoma so as to free this tissue and expose the zygomatic attachments. . . . Now I am getting ready to put in the bone-cutting forceps. The tumor began in the antrum, you see, as we estimated.

Now I am master of the situation and do not have to worry. You see how much of our work was done outside. By the ligation which we performed we have almost at once a perfectly dry field. You see we have lost very little blood for the removal of the maxilla, because we outlined a definite scheme for our work. There are the ethmoid sinuses. Now I shall turn this specimen around so you can all get a fairly good view. You see how nicely that is cleaned up.

Now we commence to reconstruct. You will be surprised when we get through with this patient what little deformity there will be after all this operation. We shall first sew up the soft tissues here so as to close up the palate, so the patient will be able to swallow. You can often cover in this entire space, but if you cannot close it you can later put in an obturator. Now we are ready to bring the lip back into position, as you see. This is the last stitch in the mucosa.

Pathologic Report (*Dr. Baugher*).—Small round-cell sarcoma with indication of alveolar structure.

Postscript.—The wound healed by primary union and the stitches were removed January 14th. She returned to the office April 5, 1916. There is not the slightest evidence of return of the disease. There is considerable puffing under the right eye, which is due to the swelling and edema from the scar tissue. She was advised to pack cotton under the eye night and morning so as to reduce the swelling. She was referred to a dentist to have a plate and an obturator made. She is to return in September, unless something occurs before that time.

(A case of "Carcinoma of Maxillary Antrum—Excision of Maxilla," together with bibliography, was published in Vol. IV, December, 1915, 1053–7.)

OSTEOMYELITIC NECROSIS OF MANDIBLE —PLASTIC RECONSTRUCTION

Summary: Clinical history of patient; comments—origin of deformity and steps to be taken for its correction; operation—elongation of fragments followed by wiring.

CLINICAL HISTORY OF PATIENT

A FEMALE, fifteen years of age, was admitted to Mercy Hospital October 18, 1915. The family and past histories are negative.

The chief complaint is a deformity of the face—"retreating chin." At the age of five years the patient had a toothache and a swollen jaw. Three days after the onset of the toothache the dentist extracted the tooth and found it was abscessed. Twelve hours after the extraction of the tooth she had a severe chill, followed by a fever of 103.7° F. She was intensely sick. The right side of the face was very much swollen and painful, and remained so for six weeks. The doctor and nurse were in constant attendance, and it was feared that the child would die. Six weeks after the extraction of the tooth the jaw was lanced below the chin on the right side. The wound drained pus and was dressed daily. No drainage-tube was inserted. The wound continued to drain a little for ten months. The swelling gradually subsided.

At the end of ten months the jaw began to swell again, but the patient was not very sick and did not go to bed. Two weeks after the onset of the swelling an abscess formed at the angle of the right side of the mandible and opened spontaneously. This wound drained very freely and had to be dressed three times a day. Shortly after this wound began draining the old one under the chin closed. The wound at the angle of the jaw drained for a year, and during this time four pieces of bone sloughed out, the largest one being one inch long and ½ inch wide. Two years after the extraction of the tooth the drainage stopped, and she has had no trouble since.

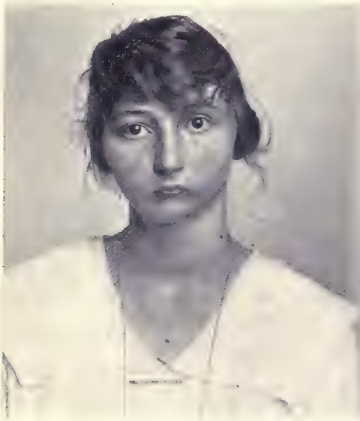

Fig. 194.—Atrophy of mandible from osteomyelitis. Note protruding upper teeth and asymmetry of face.

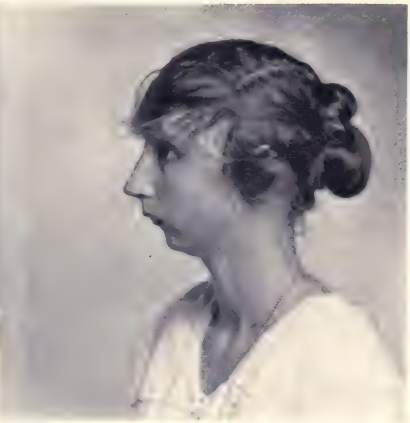

Fig. 195.—Atrophy of mandible. Note retreating chin.

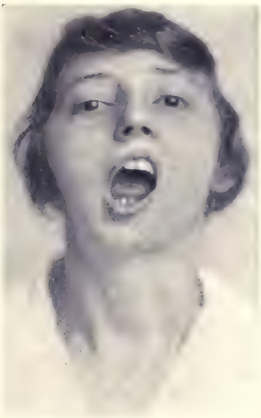

Fig. 196.—Atrophy of mandible. With mouth open, left temporomandibular joint subluxates.

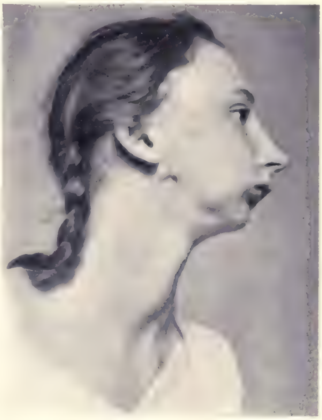

Fig. 197.—Atrophy of mandible. Note healing sinus over angle of jaw.

Three years ago the patient was operated upon to correct the deformity. The jaws were wired together for four months, the upper and lower teeth of the left side being wired together: during this time she was fed through a tube. The mother says that the doctor told her he was going to put a plate in the right lower jaw, but did not. She thinks the operation corrected the deformity a little.

Examination by Dr. Murphy (October 14, 1915).—There is considerable atrophy of the lower jaw (Figs. 194, 195, and 197). When she opens her jaw she subluxates the left side (Fig. 196). The head of the mandible is entirely gone, but the coronoid process is there, and an elongation must be made at the coronoid process. The ramus of the jaw seems to have entirely disappeared from absorption.

COMMENTS

DR. MURPHY (October 19, 1915): Here is what happened. This patient had originally a necrosis of the ramus, including the head of the mandible. She has no teeth back here. What I am trying to figure out is how much elongation will have to be made, so that when she opens her jaw it will open straight down, in place of opening to the side.

OPERATION

There is the portion that is attached to the temporal muscle. If I can make my incision through here and open into the mouth, I shall have sepsis, and then I cannot make a bone transplant, but shall have to use phosphor-bronze wire with a drill. If I do not open into the mouth, I shall make a transplant from her tibia. You can see this jaw is very thin: if I can get a transplant in there that would be fine. After that is complete and after union has taken place then I have a scheme for filling out the deformity in the chin and neck by taking fascia and fat from the thigh with the deep fat that you find in girls: you can get it very thick. We did that in a boy from Canada who had a great deformity on the side of the face: we took fascia and fat from the thigh and put it under the skin and it healed in beautifully. That is what we expect to do with this girl at the second operation. You cannot do both at the first operation for fear of infection. The correction of the soft part of the face is not so difficult a task as the correction of the bony part.

You see the displacement of the chin. See how much out of plumb it is! What I should like to do would be to put a fragment from her tibia up against the glenoid cavity and contact it below with the remains of the mandible. If you contact a transplant with living bone then it regenerates, and regenerates to the size and weight of the normal bone. Going up to the glenoid cavity you have one great danger—you do not know where your facial nerve is in all that cicatricial tissue. See that bone! It is very much thicker than one would expect. We have succeeded in getting the bone around. Now we have that part settled. You see I have ¾ inch on each fragment: that makes 1½ inches on both. I am going to try to make that rest on the end, but do not know that I can. In place of splicing it this way I think I can gain a little space by putting it the other way.

Recapitulation.—Let the record show that we divided the jaw as outlined on the skull specimen from the office, and made an end-to-end union with wire; that we did not open the mouth; that after exposing the bone it was cut with a drill, drilling all through the bone, and using the drill for the purpose of a saw; that we elongated the fragments about 1½ inches by this overlapping end-to-end union; it is held in position by phosphor-bronze wire.

Postscript.—Following the operation there was a discharge of pus from the wound. A culture made from the pus showed that it consisted chiefly of polymorphs containing a small diplococcus and occasionally a short bacillus, probably a streptococcus. She was permitted to go home on November 8th, owing to illness in her family. She was instructed to return later for examination, which she has not done to date (April 24, 1916).

CICATRICIAL FIXATION OF MANDIBLE FOLLOWING NOMA—RELEASE—INTERPOSITION OF MUCOSA FLAPS

Summary: Clinical history of patient; comments—estimate of degree of lateral motion and of amount and extent of cicatricial tissue present; types of ankylosis of mandible; operation—division of cicatricial mass—interposition of palatal and lingual mucosa flaps.

CLINICAL HISTORY OF PATIENT

A FEMALE, seventeen years of age, was admitted to Mercy Hospital June 20, 1915. The family history is negative. The patient had the usual diseases of childhood, and typhoid fever at the age of eight.

The chief complaint is ankylosis of the left jaw. On June 3, 1908, the patient contracted typhoid fever, her father and brother having it at the same time. On July 11th her mother, after having been isolated for ten days, came into the room and noticed a very foul odor. At this time, and for one week previous, the child was delirious. After two or three days the parents noticed that the left cheek was sloughing through the skin. She was sick, apparently from the typhoid, for three months.

In October, 1908, the patient was operated upon and a plastic closure of the opening was made by a skin and subcutaneous tissue flap taken from just in front of the angle of the left side of the jaw. On leaving hospital it was noticed that the movement of the lower jaw was limited to about one inch. The range of motion gradually decreased to the present condition. At present there is a separation of the teeth of 1/8 inch on the right side and there is good lateral motion. On the left side there is a deep-seated scar in the cheek.

Examination by Dr. Murphy (June 18, 1915).—The motion in the jaw began to grow less and continued to grow less with the healing. Her physician believes that the soft palate has sloughed off. The teeth are all out in relationship to the jaw. There is a firm cicatricial mass binding the mandible: this mass is unyielding, but is not bony. There is no bony ankylosis of the mandibular head. We shall have to make an interposition of tissue from the mucous membrane of the upper lip, or if the soft palate admits of it, take it from the soft palate, retaining the palatine artery for the nutrition of the flap.

COMMENTS

Dr. Murphy (June 21, 1915): What do you mean by good lateral motion?

Intern: I mean it is not limited laterally.

She does not move her jaw laterally the quarter of an inch. She does not move it up and down from its position 1/8 inch. Now why do you say there is good lateral motion?

That is the way I estimated it.

Your estimate is all wrong. How can she have good lateral motion when she cannot open the mouth? Wait until I show you the lateral motion. What do you mean by a deep-seated scar?

The cheek is sunken in on this side.

All the tissue on this side is atrophied and destroyed. Now, then, when you come to examine this case you find that the motion is very limited. The motion is about as much as that [indicating]. That amount of motion would indicate that she did not have bony ankylosis, which is correct. When you put in your finger on the patient's right side, you can put it clear back until you strike the coronoid process. On the left side you put it in until you meet the anterior margin of the first molar tooth, and then you strike a firm, hard band, which is as hard as the anterior margin of the coronoid process, and which you are apt to interpret as the anterior margin, but it is not. I think it only partially involves the masseter muscle. The masseter muscle comes down from the zygoma to insert into the outer surface and angle of the mandible [indicates on skull]. Now then, the question that arises in this case is, was this masseter muscle involved?

If the masseter muscle was involved, there is a cicatricial-tissue band in place of the masseter muscle, and then you can have the contraction extending all the way back and involving all the angle here—which would be an extremely difficult proposition to handle. Again, did the infection extend into the temporal muscle? And is the jaw ankylosed from the infection that came in from the teeth and involved the temporal muscle? And is there scar tissue involving the coronoid process and binding it to the side of the cranium, to the sphenoid wing on the side of the cranium, as I saw in one case? Did it extend as high as that? I hope not, because if it did, we should have to go in and cut off the coronoid process. If it does not, then we shall have to divide the cicatricial band that extends from one alveolar process to the other. Dividing that cicatricial band does not cure this case at all. You must not only divide it, but insert some material between the ends that will not permit a subsequent union. If you do not do that you might just as well avoid the operation. They all recur. A mere division of the connective tissue from the inside, and then sending the patient away, has no value at all. The connective tissue must be dissected out and a mucous membrane flap implanted between the ends of the divided mass.

Of all the operations for ankylosis,—of which there are four types,—this is the most difficult. Of the types of ankylosis, you have first the bony ankylosis; then you have the cicatricial formations involving the coronoid process of the mandible and the temporal muscle; and then you have the cicatricial formations in the cheek, which make the most difficult type of all—the hardest one to handle and the hardest one in which to get a good result. I remember in my early days—way back in the early nineties—I used to transplant the tissues of the cheek in there and replace the mucous membrane of the cheek by shifting a doubled-up flap from the neck, putting the woolly side in, so that we had a skin lining for the mouth and a skin covering for the cheek. That does fairly well, but the ideal method is the transplantation of the tissues of the soft and hard palate, swinging the flap around and implanting it over the mandible, so that the cicatricial formation cannot recur.

OPERATION

I am going to try to do it from the inside. I cannot tell how far back the mass of connective tissue between the alveolar processes extends, because my finger cannot go back beyond the anterior portion of that scar tissue. It is just as firm and just as hard as bone. There, you see, is the cicatricial tissue mass. See it right there! It gives you a chill when you think about it. I cannot go in to sponge anything out: I cannot go in even to lift the tongue. Look! There is the scar tissue. Now you can see the band. I am going to detach this part from the teeth and turn this part down. That is just like bone: one does not realize how hard it is unless he performs the operation himself.

Now for the first time I have effected a division backward. I must see what can be done in the way of opening the mouth. It shows that the scar tissue goes back into the masseter zone, involving, in addition, the pterygoid group. All these masticatory muscles, remember, are supplied by one motor nerve—the motor portion of the trifacial. There is evidently a fragment of bone. . . . I am dividing the masseter muscle attachment to the jaw. . . . I now displace this muscle. Look! There is the coronoid process farther behind, as a sequence of the fixation. See the location of it! See! that is a fragment of bone that was in there!

Now, you see, I started so I would be able to turn this flap down and then this flap out, so as to have mucous membrane both above and below, and then put the cheek mucous membrane back. We must put something in there that will not permit of fixation. . . . That was some job, but we succeeded in getting it in fairly good shape, I think.

Recapitulation.—Let the record show that there was great difficulty in freeing the jaw; that there had been some necrosis of the surface of the mandible at the point where the cicatricial tissue existed so long; that in this connective tissue there had developed quite a moderate sized additional coronoid process ¾ inch in front of where the normal coronoid process should be; that after freeing this and continuing the division of the fibrous tissue of the angle we took off the masseter from the surface of the mandible and part of the anterior margin of the coronoid process; then we took a flap from the palate and from the side of the tongue and inserted it between the ends of the mass of bone and fibrous tissue; all the work was done from the inside of the mouth.

Postscript.—The patient made an uneventful recovery.

DEGENERATION CYST OF NECK (LYMPHADENITIS)—ABLATION

Summary: Clinical history of patient; comments—differential diagnosis from hematoma of neck; quinsy—its nature and proper method of incision for relief; efficacy of guaiacol in tonsillitis and of emetin in amebic liver abscesses; first operation—curettage; reappearance of tumor; value of secondary pyogenic infection in coffer-damming tuberculous cervical lymphadenitis; second operation—ablation of tumor; postoperative comments—method of preventing keloid formation; the safe method of removing a tumor from the neck; method of dealing with accidental injuries to veins; value of experimental surgery preparatory to major surgery on human beings.

CLINICAL HISTORY OF PATIENT

A FEMALE, thirty years of age, a teacher, was admitted to Mercy Hospital June 27, 1915. The family history is negative. Since childhood the patient has suffered frequent attacks of tonsillitis and quinsy: in 1908 she had an attack of grip, and adenoids were removed in the same year.

The patient complains of a swelling in the left side of the neck. In September, 1914, she suffered an attack of quinsy which lasted about one week: following this attack she noticed a swelling in the left side of the neck, which remained stationary until May 30, 1915, when pain and soreness appeared in it. Throbbing discomfort, "like a boil," developed, and the mass rapidly reached the size of a hen's egg: at the end of a week the pain and soreness disappeared.

Examination reveals in the left side of the neck a tumor about the size of half of a large lemon, which fluctuates slightly, but is not painful to pressure. Bacteriologic examination of aspirated pus revealed an occasional Gram-positive micrococcus: no tubercle bacilli were found.

COMMENTS

DR. MURPHY (June 28, 1915): What injury did the patient have?

INTERN: She did not have any injury.

She did not have her neck stretched?

No, sir.

Why do I ask that question?

Because of the possibility of traumatic aneurysm arising.

Not so much aneurysm as a hematoma from rupture of the sternocleidomastoid muscle within its sheath: from a sudden, severe muscle-spasm or injury a hematoma may form in the neck, but, unlike this tumor, would disappear. The history reveals repeated attacks of tonsillitis, and eventually quinsy. What is meant by *quinsy?*

Pus formation beneath the tonsils.

What's that?

Infective cellulitis involving the posterior wall of the pharynx.

No. The pathology of quinsy is that of infective cellulitis within the cellular capsule of the tonsil—*not within the tonsil itself*, but just behind its upper pole: it is not cellulitis in the posterior wall of the pharynx; it is not cellulitis in the anterior wall of the pharynx; it is not an abscess in the tonsil. The abscess resulting from quinsy makes room for itself by pushing the tonsil inclosed in its fibrous capsule inward, thus establishing a peritonsillar abscess on the dome of the tonsil. Being situated in a rich lymphatic area, such an abscess not infrequently becomes the primary focus for metastatic infections: it is therefore urgent to give early vent to the pus to save a long period of illness. I doubt if one physician in a hundred knows how to open a quinsy properly in the stage when incision will do the most good, *i. e.*, in the earliest hours of the inflammatory attack.

The method of opening a quinsy is relatively simple. The best instrument for this purpose is a short, straight-pointed scalpel with a smooth back. Enter the scalpel at the upper angle of the protruding quinsy and cut parallel with the free border of the soft palate and close to it, curving over toward the uvula: by stretching the wound the pus flows out, and relief is usually immediate. It is a mistake to stick a knife directly into and through the tonsil itself, for by such a method the abscess may not be reached at all, and there is the danger—even though remote—of injuring the internal carotid artery, which, with the large cranial nerve-trunks, is placed ¾ to 1 inch behind and to its outer side: owing to the great degree of swelling accompanying the inflammation, however, these vital structures are still further removed from the operative field.

The development of quinsy after tonsillitis may be prevented if the patient is seen close to the time of his chill by administering tincture of guaiacol—not in five- or ten-drop doses, but *one dram every three hours for six or eight doses*, using as a vehicle half a glass of milk or some hot, sweetened water. This remedy was recommended by Sajous forty years ago, and is just as efficient in the management of tonsillitis as ipecac is in the management of amebic dysentery. Ten years ago it was considered a disgrace to give ipecac, as it was considered *passé;* but recently the investigations of Rogers, of Calcutta, have shown that ipecac has a specific action upon amebic dysentery, and that liver abscesses due to this cause could be cured in a short time with ipecac, or its alkaloid, *emetin*.

FIRST OPERATION

[Exposure of the tumor through an incision revealed a suppurating lymph-node with considerable infective perilymphadenitis. The lesion was curetted and packed with gauze, which was to be removed at the end of forty-eight hours.]

Subsequent Report.—On July 3, 1915,—five days after operation,—the swelling reappeared and became larger, until it reached the size of a hickory-nut, and on or about August 7th it began to enlarge daily until it reached the size of a duck's egg: the tumor was neither painful nor tender. The patient returned to hospital September 1, 1915.

Comments.—DR. MURPHY (September 2, 1915): What is the matter with this patient?

INTERN: She is suffering from infective cervical lymphadenitis.

What makes you think so?

I base that diagnosis upon the previous history of quinsy.

The question arises, Did the patient have quinsy immediately preceding the onset of the cervical swelling, and was the infection in the throat the primary cause of the secondary abscess in the neck?

Yes, sir, I think that it was the cause.

What, therefore, is the nature of the swelling? Is it tuberculous?

I think so.

It is not tuberculous unless there was a slumbering tuberculous lymphadenitis which was roused to activity—as often occurs—by secondary pyogenic infection from the focus in the throat: tuberculous lymphadenitis never begins with such a sudden onset, but pyogenic infection of a tuberculous lymph-node often does so. The rôle played by tuberculosis in the lymph-nodes in the neck is peculiar, and it is greatly influenced by a mixed infection. For example, when tuberculous cervical lymphadenitis arises,—as so commonly occurs in children,— if a mixed infection is ingrafted on the old or primary tuberculous infection, one is apt to consider it at first as a disaster; but the result of such a superadded infection is really the most important event that can occur in tuberculosis, because by the phagocytic and tissue reaction which it incites further transmission of tubercle bacilli in that chain of lymph-nodes is prevented, for the afferent and efferent lymph-vessels become blocked, so that that focus of tuberculosis is cured, and the patient's general system is securely coffer-dammed from further tuberculous invasion from that source.

We have had placed on the blackboard for your consideration a classification of tumors of the neck (see Vol. IV, December, 1915, 1065–6).

SECOND OPERATION

[Through an appropriate incision the cystic mass was enucleated intact: it rested upon the internal jugular vein, which, however, was not disturbed during the process of enucleation. After securing complete hemostasis the wound was closed without drainage. The specimen ablated was not a pure cyst, but was a sac the remnant of an infected lymph-node, and contained bloody *brie* with an excess of fluid. Microscopic examination later substantiated the gross diagnosis.]

Postoperative Comments.—In order to lessen the likelihood of deformity from the resulting scar or keloid formation within it I took pains to incise the skin perpendicular to the surface, and to avoid beveling the skin. On exposing the tumor it was found to present a definite capsule, and immediately I knew that I was not dealing with a retention cyst from the remnants of a branchial cleft, for such a cyst in this position, instead of having a definite capsule, would have been more or less blended with the regional tissues, difficult to remove, and practically impossible to enucleate.

While removing the tumor I observed the usual precaution of hugging its wall very closely with the knife, so as to avoid injury to the jugular vein, to which it was adherent, or to the carotid artery, which could be seen pulsating in the field, or to other important structures, especially nerves: at the same time I took pains not to open into the sac itself, not alone to obtain the advantage of having the bulk of the filled-out sac to work against, thereby enabling me to perform a more complete enucleation than would be the case were the sac empty and collapsed, but also to save the girl from a long convalescence, which would ensue were the sac ruptured and the infective contents scattered in the surrounding tissues, requiring prolonged drainage of the wound and consequent prolonged stay in hospital; the point where the sac was most liable to be opened into was at its site of attachment to the scar which followed the original operation.

Had I inadvertently cut the jugular vein I would have sutured it, and not ligated it. A vein may be sutured very readily. While the veins of the neck have a plus pressure on expiration, on inspiration they have a minus pressure, and if opened into when there is a minus pressure, while less hemorrhage ensues, yet there is greater danger of inhalation air-embolism.* I recall a case in which I was removing a tuberculous lymph-node from the internal jugular vein, close to its junction with the subclavian: my finger slipped from the tumor and tore a hole in the subclavian vein, and I was unaware of the accident until, on removing my finger, which plugged the hole, there was a gush of blood which rapidly welled forth, obscuring the operative field; I thrust my finger back into the hole and kept it there until I had applied five forceps, after which I merely top-sewed the vein.

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* Attention was first called to this by Dupuytren.

Instead of being alarmed, we felt perfectly at home, for the incident occurred just after we had completed our experimental work in blood-vessel surgery: for the man who aspires to be a surgeon there is no line of experimental work that qualifies him for all his subsequent surgical procedures so well as this, for having done experimental work on arteries and veins, one gets to feel so much at home in the sense that one knows how to handle any emergency that may occur, and never experiences that sensation of being "lost." I recall a case in which a dilated pelvis of the ureter that had spread behind the renal vessels was exposed at operation: in freeing this cyst from the latter I tore the vena cava inferior; that was, indeed, an embarrassing situation, but knowing that the vena cava has scarcely a plus pressure in that zone, we did not try to ligate it, but merely applied two forceps and top-sewed it, using a fine needle, and the patient did not have an untoward symptom. After one has divided the vena cava in a dog and sutured it end-to-end, and after one has divided the aorta in a dog and sutured it end-to-end, one will not feel embarrassed when one tears a blood-vessel close to the aorta or tears the vena cava in a human subject.

After completion of the blood-vessel work the next thing to do is experimental work on the chest,—on the pleura, lung, pericardium, and heart,—whereupon one is quite well prepared to deal with any surgical emergency that might arise. In surgery, as in war, one must provide a haven of safe retreat, so that during the progress of an operation one could say, "If so-and-so should happen, this is what I will do: I will retreat to such-and-such a place and I am safe." For example, when in the course of the operation of gasserectomy the middle meningeal artery is encountered, one can say, "If that middle meningeal artery should give me any trouble, I will at once go down and expose the tip of the greater cornu of the hyoid bone and tie the external carotid artery opposite it."

Postscript (*April 27, 1916*).—Examination today reveals no evidence of return of the trouble in the neck.

LIPOMA OF SHOULDER—ABLATION

Summary: Clinical history of patient; comments—lesions resulting from trauma to shoulder; illustrative case of sarcoma of shoulder; relation of trauma to sarcoma and carcinoma; operation—cutaneous nerve supply to shoulder—ablation of tumor.

CLINICAL HISTORY OF PATIENT

A female, fifty years of age, was admitted to Mercy Hospital December 30, 1914. The family and past histories are negative.

The chief complaint is of a tumor mass on the left shoulder. Five years ago the patient fell downstairs, striking her left shoulder. She had trouble at the time, but one year later began to notice a slight pain in the left shoulder and a swelling about the size of a walnut. The mass has remained about the same size. The pains are fleeting in character, and lying on the left side at night causes pain. There is no limitation of motion in the shoulder-joint.

COMMENTS

Dr. Murphy (December 31, 1914): The lesions that result from falling and striking on the shoulder are, first, paralysis of the deltoid muscle, which is the commonest; secondly, fracture of the surgical neck of the humerus; thirdly, fracture with luxation; fourthly, luxation without fracture; fifthly, the development of a neoplasm after the injury, and the commonest neoplasm that develops is sarcoma, and it comes from just this type of injury. We had a very beautiful case illustrative of this last not so long ago. A man, in trying to catch a sack of wheat, strained his shoulder. Some six or eight weeks later he was walking through the yard when he caught his foot on a rope and again strained his shoulder. Then he had osteopathic treatment and liniments, and he came in here some months later with a diagnosis of fracture of his shoulder, which was right, but his fracture came on when he was putting on his coat one night, and it was a pathologic fracture, and the real lesion was a sarcoma of the humerus. You never break a normal humerus putting on your coat. That was the story—an injury, a second injury, the development of the tumor, continuous treatment by rubbing, etc., without arriving at a diagnosis. We resected the upper extremity of the humerus bearing the neoplasm. [Eventually this case came to interscapulothoracic amputation: it was reported in Vol. IV, December, 1915, 1085–93.]

The case before us today is not a sarcoma: it is a lipoma, and the doctor's history is worthless. She did not strike on her shoulder: she struck on her elbow. She has developed here a lipoma or an angiolipoma, but it feels more like an ordinary lipoma.

There is not a particle of doubt in my mind regarding the relation of trauma to sarcoma and carcinoma. You have sarcoma occurring as the sequence of a single, moderately severe injury. You have carcinoma occurring as the sequence of recurrent mild irritations. Whether or not the latter are traumas does not seem to matter. In the breast it is just the opposite: here it is one moderately severe trauma that starts the carcinoma, just as in the case of sarcoma. The breast is the only place in the body where carcinoma starts immediately from a moderately severe trauma of single occurrence.

OPERATION

In this region of the shoulder the cutaneous nerve-supply comes mostly from the acromial branches of the descending cervical nerves, while the circumflex also contributes a few twigs, so that you may make your incision at any place and you are fairly safe, because you have your two supplies. [The tumor was found originating from the aponeurosis of the supraspinatus muscle and was ablated.]

Pathologic Report.—An irregular mass, 4.5 x 4 x 2 cm., composed of fatty lobes ranging in size from a pea to a walnut. Microscopic diagnosis: lipoma.

Postscript.—The patient made an uneventful recovery and left hospital January 11, 1915. Up until October 19, 1915, no recurrence had taken place.

Where do they begin? They begin in the epithelial structures. They do not begin in the lymph- or blood-stream. This tumor today is neither in the breast nor connected with the skin. But what may you have in that position?

An aberrant gland.

An aberrant mammary gland.

OPERATION

The tumor annoys her from the pressure it produces. I am making this incision in the transverse direction in place of the ordinary oblique direction from the breast to the axilla. . . . Now you come onto a mass of cheesy material that goes to make up the neoplasm, and you come onto your pectoral fascia. The question in my mind was, Was this a lymphangioma or was it a lipoma? It is a lipoma with a considerable stroma of connective tissue in it. [Ablates tumor, cuts it open, and examines it.] Here are some nodules which are suspicious: Are they neoplasms inside the lipoma? No. They are just fatty masses. It is not an aberrant mammary gland: it is just an excessive deposit of fatty tissue in the lipoma. It is not malignant, as we interpreted it.

POSTOPERATIVE COMMENTS

In establishing the diagnosis between lipoma of the axilla and lymphatic cyst of the axilla the case of "Congenital Cyst of Neck Extending into Axilla," which was recently published in the CLINICS (Vol. V, February, 1916, 1–5), enters into the discussion. In both conditions inflammatory symptoms and signs are absent unless infection has occurred. Both are of slow growth. In both pain is present only when a nerve of the brachial plexus is stretched or compressed. The cyst is more apt to fluctuate than the lipoma, unless the fatty content of the latter is very soft, in which case the differentiation from cold tuberculous abscess comes up. If the cyst has both a cervical and an axillary loculus, as in the case referred to above, bimanual palpation would suggest an interchange of fluid between the two loculi of the cyst. When the lipoma is deep to the axillary fascia a false impression of its consistency is apt to be conveyed from the addition of the dense axillary fascia as a capsule for the lipoma, just as in the case of subfascial lipoma elsewhere in the body, whether beneath the palmar fascia,* the fascia lata, or the plantar fascia. In the case of lipoma a skiagram would show nothing, while in the case of a lymphatic cyst a skiagram might show a clear area where the fluid is. Exploratory puncture with a hypodermic needle offers a valuable method of differentiation, though it is not always advisable.

A note of warning should be sounded against rushing into the axilla with a knife in order to open an axillary "abscess," without having given much thought to the differential diagnosis. Thus Richet (*Gazette des Hôpitaux*, 1879, 801) was on the point of opening what seemed to him an axillary abscess, when he fortunately felt a thrill, and on further examination detected bruit.† The case was one of axillary aneurysm. An axillary abscess also may be lifted at each beat of the artery, and to this extent it resembles an aneurysm, but the pulsation is not expansile. A cyst may, as a great rarity, lie over and conceal an aneurysm; or, more commonly, an abscess may arise around such a tumor, so that the pus bathes the outer surface of the sac. Yet a certain flaccidity follows compression on the artery above, and bruit will almost certainly be present: it is hardly possible that both these signs should be absent. In cases of doubt—and even, indeed, as a precautionary routine measure—it is wise to explore with a hypodermic needle, withdrawing clear fluid, turbid fluid, or pus, or blood in the presence of cyst, abscess, or aneurysm, respectively.

Hilton ("Lectures on Rest and Pain," ninth ed., 130) says: "Some surgeons, when speaking of deep abscesses, say with rash confidence, '*Plunge in a knife!*' It is a grand term—'*Plunge a*

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* When a cyst is constituted by an excess of fluid occupying an anatomic sac, the situation of which is known and constant in the body, the diagnosis from subfascial lipoma is rendered easier by the effects of the anatomic peculiarities of the region upon the tumor in question. Thus the differentiation of *lipoma arborescens* in the palmar synovial bursa from *tuberculous tenosynovitis* of the same structure was brought out in the "Talk on the Surgery of Tendons and Tendon-Sheaths" (Vol. V, April, 1916, 216).

† In his article on "Anéurysme" in the "Dictionnaire de médecine," Richet gives the following excellent advice: "There are three points where the physician should always practise auscultation before opening abscesses in these regions: first, the popliteal space; secondly, the groin; thirdly, the axilla."

LIPOMA OF AXILLA—ABLATION

Summary: Clinical history of patient; comments—dialogue with intern *in re* diagnosis; operation—ablation; postoperative comments—differential diagnosis between lipoma of axilla and lymphatic cyst of axilla; diagnosis between axillary abscess and axillary aneurysm; Hilton's method of opening a deep axillary abscess.

CLINICAL HISTORY OF PATIENT

A FEMALE, thirty-eight years of age, was admitted to Mercy Hospital September 27, 1915. The family, past, and menstrual histories are negative.

The chief complaint is of a growth in the right axilla. About five years ago the patient noticed for the first time a small, hard growth the size of a pea in the right axilla. It caused no annoyance, and she paid no attention to it. It gradually increased in size until two years later, when it was the size of half an apple, and then she occasionally had a dull pain in it. At present it is tender to pressure, and there is an occasional dull ache in it. It is soft and diffuse, and is located just beneath the right axilla (Fig. 198).

COMMENTS

DR. MURPHY (September 29, 1915): What is the matter with her?

INTERN: She has a growth in the axillary margin of the right breast. It is probably a fatty tumor.

What do you mean by that?

A tumor located in the fatty tissue.

What else about it? Is it a carcinoma?

No, doctor.

Why not?

It is of five years' standing.

Sometimes carcinomata are of five years' standing.

She has no opening in the skin.

What do you mean? Do you have to have an opening in the skin to get a carcinoma?

No. It has been there for five years, and she has had no pain until a year ago.

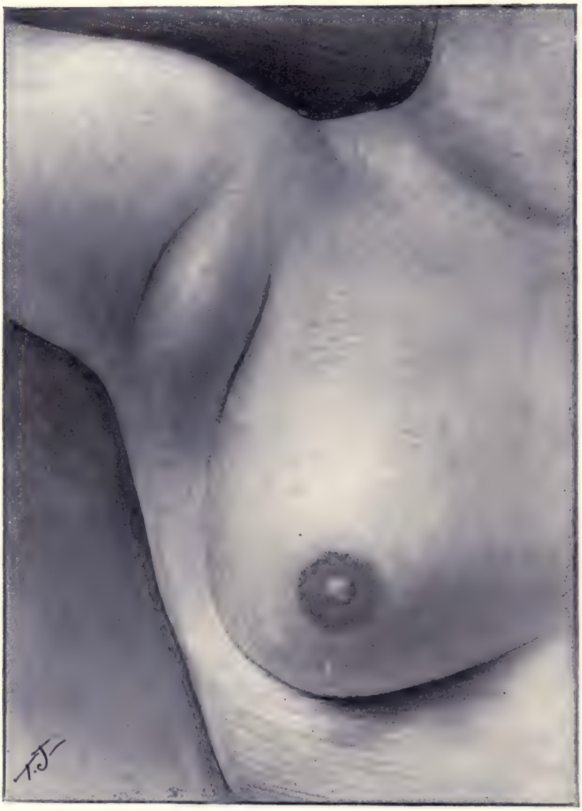

Fig. 198.—Shows a tumor just beneath right axilla. Operation reveals the tumor to be a lipoma.

But you do not necessarily have pain with carcinoma. It is not in connection with what?

It is not in connection with the lymph- or blood-stream.

Is that where a carcinoma begins?

No.

knife into a deep abscess.' It is not a courageous plunge for the surgeon; for it is without danger to himself, while perhaps it is a fatal stab to the patient." Every one should be thoroughly familiar with Hilton's method of opening a deep abscess, and since Hilton described his method in connection with opening a deep abscess in the axilla, the citation in his own words is quite germane to our thesis. "Cut with a lancet through the skin and cellular tissue and fascia of the axilla about half or three-quarters of an inch behind the axillary edge of the great pectoral muscle. At that part we can meet with no large blood-vessel. . . . Then push a grooved probe or grooved director upward into the swelling in the axilla; and if you will watch the groove in the probe or director as it is being passed up through the comparatively healthy tissues into the axilla, a little stream of opaque serum or pus will show itself. Take a blunt (not a sharp) instrument, such as a pair of 'dressing forceps,' and run the closed blades along the groove in the probe or director into the swelling. Now, opening the handles, you at the same time open the blades situated within the abscess, and so tear open the abscess. Lastly, by keeping the blades of the forceps open during the withdrawal of the instrument, you leave a lacerated track or canal communicating with the collection of pus, which will not readily unite, and will permit the easy exit of the matter."

Postscript.—The wound healed *per primam.*

MELANO-EPITHELIOMA IN PIGMENTED MOLE OF BREAST WITH METASTASES TO AXILLA—ABLATION OF TUMOR AND ENLARGED AXILLARY NODES

Summary: Clinical history of patient; comments—cellulitis of axilla a dangerous lesion; caution not to traumatize a pigmented mole; operation—ablation of mole and enlarged axillary lymph-nodes.

CLINICAL HISTORY OF PATIENT

A FEMALE, forty-one years of age, by occupation a nurse, was admitted to Mercy Hospital February 14, 1915. The family, past, and menstrual histories are negative.

The chief complaint is a tumor mass in the right axilla. Three years ago the patient noticed for the first time a small, freely movable superficial lump in the right axilla toward the arm. There were some discomfort and a slight drawing pain down the arm, but severe pain was absent. She thinks that the lump has enlarged, and very recently she has noticed another lump above the first. She gives a history of having had an infection about the index finger-nail of the right hand lasting from two to four weeks, but had no lymphadenitis or constitutional symptoms at the time.

Examination by Dr. Murphy (February 12, 1915).—The only sensitive zone is in the lower superficial skin fold in the axilla. It is not an enlarged lymph-node: it is one of those sebaceous accumulations that has recurrences or exacerbations of inflammatory reactions and then entirely subsides. She has no enlarged lymph-nodes at all. She has a pigmented mole on the right breast, which should be removed at the same time.

COMMENTS

Dr. Murphy (February 15, 1915): These are not tuberculous lymph-nodes. If these accumulations should become infected, the situation would be very serious. Infections tend, of course, to rapid cellular destruction, and cellulitis in the axilla extends up into the subclavian spaces and frequently terminates fatally. It is one of the things you must watch carefully—in fact, much more carefully than you must watch a carbuncle in the neck.

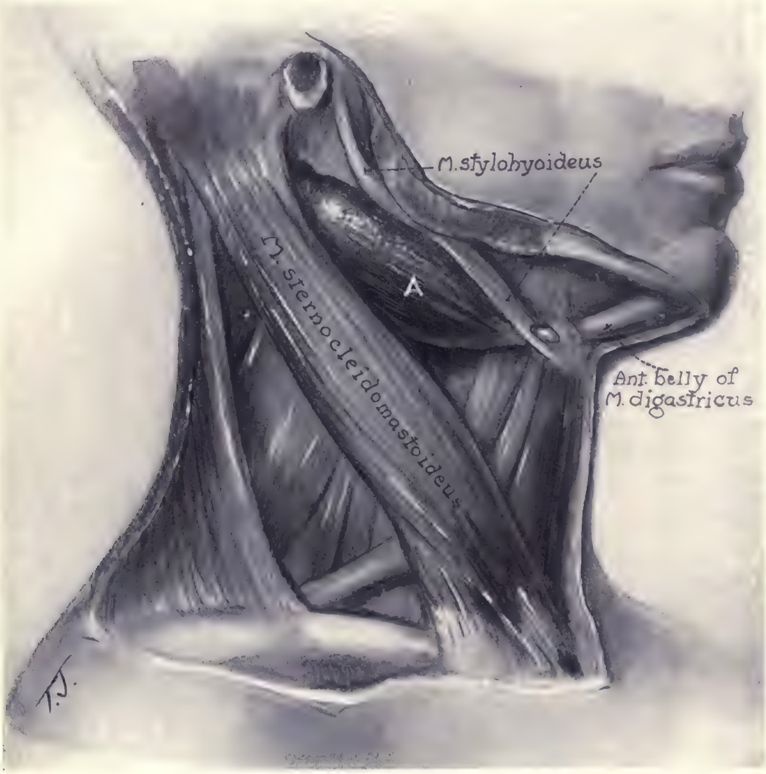

Fig. 199.—Melanotic tumor in posterior belly of digastric muscle (*A*). A few muscle-fibers are stretched across surface of tumor. (Case reported in Vol. V, August, 1916, 551–563.)

She also has a mole on the breast which we are to remove. In taking out these moles you must never pinch them in the forceps, for if you should pinch them, you might produce a very serious situation. These pigmented moles are always dangerous, and when traumatized are liable to produce the most wicked types of malignant growths, whether carcinomatous or sarcomatous. (See Vol. V, August, 1916, 551–63.) The peculiar thing is that they have a tendency to metastasize in the derma: they go into the subdermal tissue just beneath the derma.

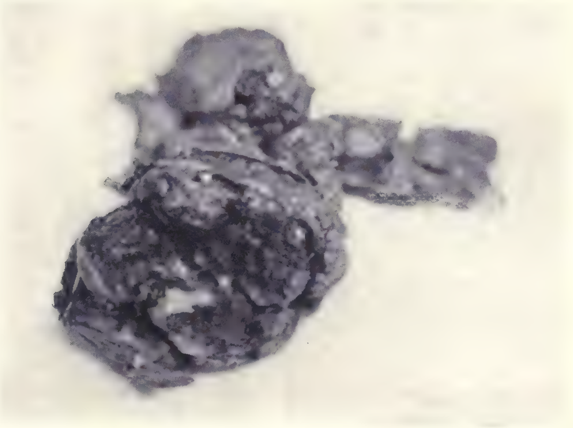

Fig. 200.—Photograph of melanotic tumor of posterior belly of digastric muscle after removal.

OPERATION

[The pigmented mole was ablated, with a wide margin of healthy skin. The enlarged nodes in the axilla were removed. Both wounds were closed without the insertion of drainage.]

Pathologic Report (*Dr. Baugher*).—Melano-epithelioma of pigmented mole with metastases to axillary lymph-nodes.

Postscript.—Patient left hospital on February 27, 1915.

A comprehensive article reviewing the subject of melanotic cancer, together with a report of 91 cases, was published by Coley and Hoguet in *Annals of Surgery*, August, 1916, 206–41.

TABLE GIVING ESSENTIAL POINTS IN 91 CASES OF MELANOTIC CANCER.—(*Coley and Hoguet.*)

Males	51
Females	40

Age average in 82 cases (not stated in 8 cases), 86.8 years. Mole present in 86 cases.

Site of primary lesion:

Not given	1	Leg	5
Eye	11	Thigh	5
Axilla *	4	Testis *	1
Back	9	Foot	3
Neck	10	Abdominal wall	1
Shoulder	4	Toe	5
Behind ear	5	Cervical glands *	2
Cheek	2	Scalp	1
Chest	3	Heel	4
Breast	1	Face	2
Ankle	5	Pubes	1
Arm	2		—
Rectum	1		91
Groin	3		

Cases of irritation of a mole = 17.

Removal of a mole in 14 cases, by surgery, electricity, and caustics.

* In these cases no other primary focus could be found.

SCIRRHOUS CARCINOMA OF BREAST—RADICAL ABLATION

Summary: Clinical history of patient; comments—the presence of a tuberculous lesion of the rectum, together with the sudden onset of the breast symptoms, complicates the diagnosis; modification of operation in tuberculosis of breast; tuberculosis of costal perichondrium; operation—radical breast removal; pathologic report; postscript; case illustrative of baneful results of allowing cicatrix to constrict neurovascular bundle of axilla without hindrance, and emphasizing advantages of using pectoralis minor muscle to cover over that bundle.

CLINICAL HISTORY OF PATIENT

A FEMALE, thirty years of age, was admitted to Mercy Hospital May 1, 1916. The family history is negative. When fifteen years of age, the patient had typhoid fever, from which she made a good recovery. She has been married fourteen years, and seven months after marriage had a premature labor at seven months. She has never been pregnant since, and her menstrual history reveals nothing of significance. In May, 1914, she was in this hospital suffering from tuberculosis of the rectum and metastatic arthritis of left knee: she was discharged June 20th, feeling well. She has been on tuberculin treatment ever since.

The chief complaint is a painless swelling in the upper inner quadrant of the right breast. In April, 1915, while stooping over, the patient felt a sharp pain in the upper inner quadrant of the right breast, and on palpation felt a small, fairly hard swelling about the size of a hazelnut and but slightly raised: it was not tender. She consulted a doctor, who said that the swelling would probably subside. It enlarged slowly up to the winter of 1915, and since then the enlargement has been more rapid. The tumor has never been painful, except for occasional sharp pains in that region lasting only a few minutes and not radiating. There has never been any secretion from the nipple, nor has there been eczema or ulceration of the nipple or skin. At first the tumor was movable under the skin, but it now seems tighter and more drawn.

The patient does not recall any trauma to the breast: she had no acute illness preceding the swelling or at the time of its onset, nor has she had chills or fever. The tuberculin treatment has had no effect on the swelling. She has had no treatment for the swelling, nor has she applied anything to it.

At present the tumor is about the size of a hen's egg. During the last month the skin over the swelling has slightly discolored to a light brownish tint.

Examination by Dr. Murphy (April 27, 1916).—The mass in the breast is getting larger and is becoming fixed to the skin: it does not move any longer under the skin. There is neither involvement of any other portion of the right breast, the right axilla, nor of the left breast that I am able to palpate in this way. A Wassermann test proved negative.

COMMENTS

DR. MURPHY (May 2, 1916): The suddenness of onset of this lesion and the pain and sensitiveness as acute manifestations made us believe that we were dealing with metastatic mastitis—metastatic from the mixed tuberculous infection of the rectum as either a pyogenic or tuberculous secondary involvement of the breast. Under continued tuberculin treatment the rectum, which was stenosed almost to complete occlusion, has enormously improved, so that now there is a white scar in the bowel, with a little accumulation of pus above the stricture, which is large enough to permit the bowels to move without any pain or discomfort. She has gained very greatly in weight, and scarcely is aware that she has any trouble in the rectum. She has no other symptom or sign of tuberculosis, with the exception of the possibly tuberculous lesion in the breast.

The operation is to be partly exploratory. If the lesion is tuberculous, the whole breast must be removed, while if carcinomatous, the breast and the axillary lymph-nodes must be ablated. With tuberculosis the axillary lymph-nodes do not need to be removed, because tuberculosis, when a mixed infection, is one in which the afferent lymphatics are closed on account of the suppuration around the primary focus. Tuberculosis of the breast is a very rare disease, and we have seen but a few cases in our entire experience. The tumor occupies the upper inner quadrant of the breast. In the analysis of this case there is no evidence that the lesion began in the perichondrium of the costal cartilages, because the mass seems to move freely on the chest-wall, nor that it began in the bony ribs, for the same reason. Tuberculosis of the costal perichondrium is one of the commonest and most persistent lesions of tuberculosis that one encounters. There is no evidence that she had a lesion inside the chest. There is no palpable enlargement of the lymphatics, and the skin is attached to the tumor.

OPERATION

We must make the incision as an exploratory one, on the assumption that the lesion is not malignant. [Retracts margins of incision, exposing chest-wall.] . . . The estimate that the lesion does not involve the costal cartilages was correct. Now we are coming onto the mammary gland, as you see, near the nipple. . . . This breast feels mighty hard, and the tumor looks like a scirrhous carcinoma. The story is one of infection, but the gross specimen looks like a carcinoma.

Let the record show that fibrous trabeculæ run throughout the entire breast.

There is the pectoralis minor muscle now in the field. . . . There is a small lymph-node. . . . There is a vein. . . . See that fibrous-tissue formation everywhere! It is the aponeurosis that carries the lymphatics: that is the structure you have to remove. There is the external respiratory nerve of Bell: we shall test it with the faradic excitor to see that it has not been injured. [Applies excitor.] . . . it is all right. [Completes dissection of axilla, removes tissue-mass, and begins to close wound.] . . . Now we use this pectoralis minor muscle to cover over the neurovascular bundle of the axilla: by doing that you do not have the edema of the arm with neuritis following operation. Now you see what a nice protection that muscle has made! You never have the cancer transmitted through the pectoralis minor. Now there is no tension on the sutured incision: it comes out fine. We are inserting a drain.

Recapitulation.—Let the record show that the tumor occupied the upper inner quadrant of the breast; that it was entirely free of attachment to ribs or costal cartilages and had not attempted to penetrate the pectoral muscles, but was clearly encapsulated as a hard, fibrous mass; that the tumor was first attacked in the upper inner quadrant of the breast, but the gross appearance (Fig. 201) was so suspicious of a scirrhous carcinoma that it was decided that the whole breast should be removed, together with the fascia and fat of the chest-wall and axillary fold *en bloc;* a most complete dissection was made, extending up to the clavicle; the peculiar part was that there was no enlargement of the axillary lymph-nodes that could be detected.

Let the record show further that a transverse incision was made,—almost directly transverse,—and a "T" upward from that point; that the long subscapular and posterior thoracic nerves both were conserved; that the sheath was taken off from both the pectoralis major and the pectoralis minor muscles; and finally that there were grumous cysts in the breast, with masses of connective-tissue strands everywhere throughout the organ.

Pathologic Report (*Dr. Albert H. Baugher*).—Clinical diagnosis: Carcinoma or tuberculosis of breast. Latter diagnosis probable because of previous tuberculosis of rectum.

Description of material: Tumor-mass from upper inner quadrant of right breast, measuring 5 x 5 x 2.5 cm. Hard mass adherent to skin. Elliptic pieces of skin removed, 5.7 x 5 cm. Remainder of breast and additional skin and axillary dissections. Two small lymph-nodes are found, measuring 6 x 3 x 3 mm.

Microscopic Diagnosis.—Scirrhous carcinoma. No mitosis of cells observed in the several sections examined. Chronic cystic mastitis. No cancerous metastases found in the two axillary lymph-nodes which were examined.

Postscript.—The drainage-tube was removed May 6th—four days after operation. There was not a drop of fluid escaping.

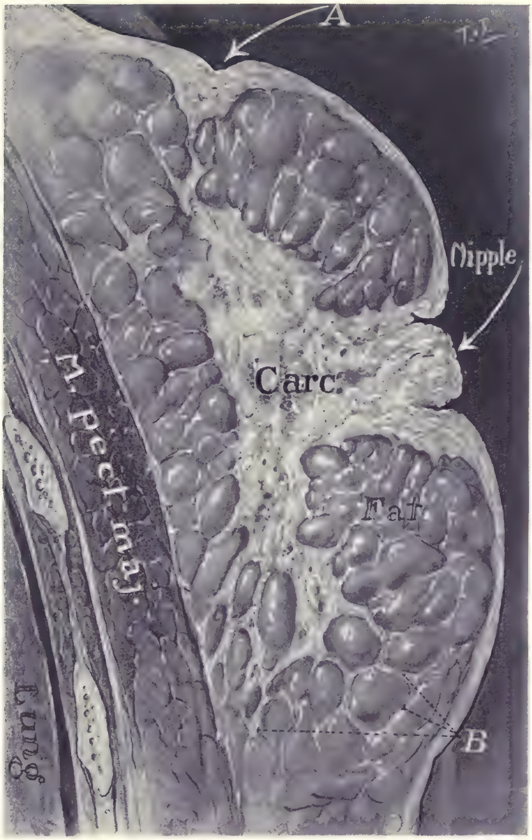

Fig. 201.—Scirrhus of breast *in situ.* Note how carcinoma had directed itself toward the skin, and how the skin had indented itself to meet the carcinoma at *A*, as well as the carcinomatous changes which had taken place under indented surface of skin. The white fibrous tissue masses throughout breast and fatty tissue contributed to the encapsulation and retention of the carcinomatous cells in the breast. This patient had been under treatment for a long time for tuberculosis of the rectum, and it is a question whether the tuberculin stimulated the development of the connective tissue around the cancer-cells. The connective-tissue deposit is striking because the woman is under forty and fat—conditions which contribute to early dissemination through lymphatics and lymph-nodes of carcinomatous cells; still there was no lymph-node involvement anywhere, and, furthermore, the carcinomatous cells were intensely encapsulated. *A*, Skin indented to meet carcinoma; *B*, white connective tissue, not carcinomatous. Note how nipple is indented.

The wound is in perfect condition. The stitches are to remain in from thirteen to eighteen days.

May 14th: The pulse and temperature are normal. The patient is sitting up every day. The flap is perfectly viable, and the stitches are to be removed on the eighteenth day.

DR. MURPHY: Apropos of my employment of the pectoralis minor muscle to cover over the neurovascular bundle of the axilla in this and in similar cases, in order to prevent postoperative edema of the arm with neuritis, I wish to read you a letter received recently from a physician in New York State:

DR. JOHN B. MURPHY,
Chicago, Illinois.

My dear Doctor: While in your clinic last fall I heard you allude to an operation upon the breast by which you prevented the constriction of vessels and nerves by the scar. Your remarks brought forcibly to my mind a case under my care at that time, and who has recently died. I am sending you herewith a photograph—the best exposure the family would allow. The history is briefly this:

Mrs. E. M., sixty-eight, widow, no children. Six years ago amputation of right breast for cancer. After operation good health for three years, when she developed severe pain in upper part of scar and in right shoulder and arm, the pain later extending to forearm and hand. About one year later the hand began to swell, and gradually the entire arm became swollen from about the deltoid insertion down. For the past year the pain has been somewhat less, but the arm and hand have felt cold and dead to her, the weight being the chief discomfort. The patient developed some bronchial symptoms about one year ago—also on the right side.

The arm, as you see, is wasted at the shoulder (Fig. 202); the swollen part is hard, as of wax, and has presented no ulceration. The right hand measures in circumference 16¾ inches, as against 7½ for the left hand; right elbow girth, 17⅖ inches; left, 6¼. The shoulders measure the same on both sides.

The patient has persistently refused any but palliative treatment after her first operation.

Yours very truly,

—— ——

P. S.—The operation—made by another man—was evidently a Halsted. The pain in operative scar and arm began about two years after operation, while the swelling began about three years after operation.

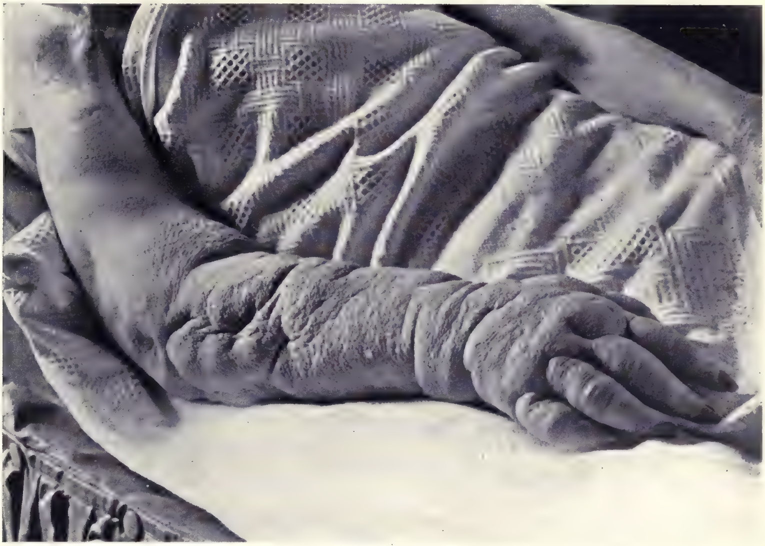

Fig. 202.—Elephantiasis following radical operation for cancer of breast. The arm is wasted at shoulder. The swollen part is hard, as of wax, and free from ulceration. "A brawny arm develops in 16 per cent. of all cases of breast cancer. . . . Sometimes a sharp line of demarcation in the deltoid region separates the swelling from the normal tissues above."—*Handley*. (Courtesy of Dr. John M. Quirk.)

It was for certain cases of this type that Handley, in 1908, first proposed the operation of lymphangioplasty (*Brit. Med. Jour.*, 1910, i, 853; 922).

INGUINAL HERNIA—ANDREWS OPERATION

Summary: Clinical history of patient; comments—the high mortality of internal intestinal obstruction; operation—Andrews imbrication herniorrhaphy, with running comments upon same.

CLINICAL HISTORY OF PATIENT

A MALE, thirty-three years of age, by occupation a baker, was admitted to Mercy Hospital January 20, 1916. The family history reveals that one sister died of pulmonary tuberculosis at the age of seventeen. The past history is negative.

The chief complaint is a left-sided inguinal hernia. Ten years ago, in 1906, the patient was lifting a 140-pound bag of flour when it started to slip from his grasp. He strained himself recovering it, and immediately afterward noticed a lump in the left inguinal region, which enlarged on coughing or straining. This lump remained large for about one year, but the constant wearing of a truss reduced it somewhat.

In 1909 the patient had a severe pain in his lower abdomen, followed by nausea and vomiting of bile. He had no fever and no chill. His abdomen was neither distended nor tender. He had a bowel movement the next day, but it did not contain mucus or blood. This was the only attack of its kind he ever had. His side has felt weak ever since he strained it in 1906.

COMMENTS

DR. MURPHY (January 22, 1916): What was his temperature in that attack?

INTERN: He did not have any fever.

If that is correct, you would say that he did not have appendicitis. He is in today for his left-sided hernia. Were it a right-sided hernia, we could take out his appendix through the opening very easily. We rarely ever now see a strangulated hernia of long duration, but you still have a class of cases in which the mortality has not changed in thirty years, and that is internal intestinal obstruction, which still has about a 50 per cent. mortality. That is a sad comment to make—that 50 per cent. of the cases of internal strangulation die. They do not die from the operation: they die because the operation was postponed too long.

OPERATION

In making the incision for hernia never make your incision low down in this inguinal fold: make it high up in the external oblique muscle, for then you will have your scar in a place where you can take care of it well. There is the anterior superior iliac spine. [Makes incision above Poupart's ligament and parallel with it.] . . . Now go down onto the aponeurosis of your external oblique muscle: expose that muscle fully, so that you have all the fibers spread out before you. You see how nicely all that opens up to me. . . . There is the inguinal canal. Now you have full exposure of your field. Now you want to get Poupart's ligament ready.

The next proposition is to prepare for the imbrication operation, which requires a longer lower flap. We consider the imbrication operation—which was worked out by our colleague, Dr. E. Wyllys Andrews—as the best operation for the cure of an inguinal hernia. I am dividing the external oblique aponeurosis parallel with the long axis of its fibers: I am dividing it above so as to make a canopy for the new canal. . . . The next step after that is accomplished is to free all the contents of this canal from their surrounding structures. There is the ilioinguinal nerve, resting upon the spermatic cord: you push it out of your field away over to the opposite side, because you do not want to interfere with it and you do not need to interfere with it.

Now what is the next step? There are the contents of this canal: I am lifting them up and freeing them from all binding structures. . . . Now I shall go on the outer side, freeing all the tissues again, and bring up the entire contents of that canal —the vessels, the sac, the vas deferens, etc. . . . Now, then, every single structure has been lifted out of that canal: nothing at all remains in it.

Now the next step. The next step, look! is to find your sac. . . . Here is your sac. The sac is always to the upper, inner side, because the blood-vessels and the vas deferens enter the canal from behind forward, while the hernia enters from above downward. There is the lower margin of the sac. See the white line! . . . Now the sac is open. Now the next step is to care for the contents of the sac. Let us free the sac from the neighboring structures—from the vas deferens, the blood-vessels, and the bladder. Remember, the bladder is one of the important structures liable to be encountered when dealing with the sac, and that this organ has been injured a number of times. Now I can put my finger into the sac. . . . Now I am freeing the attachments. . . . That is the extraneous connective tissue. I am passing around to the other side to see if we have an attachment to the bladder. You see the sac and the vas: there is the vas, right there. See it standing there on my thumb! It is out of harm's way.

Now then, the next step is to look for the contents of the sac. . . . Here is some omentum: it must be freed from the inner lining of the sac and dropped back in. There is the intestine and you recognize it. We want to free that omentum from the sac. That is one of the epiplocele attachments: I drop it back. Remember, the caput coli has been tied off and the sigmoid has been tied off and the urinary bladder has been tied off very frequently in the ligation of a hernial sac. That is one of the fatty tags from the sigmoid which had become adherent in the sac. . . . Now the whole contents of the sac have been pushed back, so that we are all right as far as what is within the sac is concerned. Now in ligating this sac the bladder is occasionally ligated. Let me show it to you. There is the urinary bladder. See that white line! How easily it could be tied in with the sac! Remember, the bladder is never tied in the sac—the bladder is tied outside the sac. . . . Now we are looking into the sac to see that nothing is tied off within: when you do it that way you do not have subsequent trouble. Now the next step is the management of the remaining portion of that sac: I split it down to the place where it is tied and take this needle, put it in, and pick it all up. . . . Now that vas deferens cannot get away.

Now I want to see how much of a reduction I need to make of the cord. There is the vas and there are the vessels and there is a lot of extraneous tissue: I keep that there until I am ready to close. I do not need any of that portion at all. . . . Now I am getting all this connective tissue that has formed on the outside out of my field: you can see how much that is going to reduce the bulk of the tissue that is going to stay in the canal. There is the vas and there are the vessels. What am I going to take off? The continuation of the cremasteric muscle and the fibrous tissue that developed around it, and you see I am reducing that about 40 per cent. in bulk: that is very important for permanency of cure. There, you see, is the cremasteric muscle. There are some of the veins of the pampiniform plexus that are outside. Now you see what a small quantity of tissue I have in that canal compared with what I had.

Now we are going to get ready to close. We simply throw the vas and the vessels over on the side. There is Poupart's ligament, you see. There is the aponeurosis of the external oblique. There is the conjoined tendon. See it shining through! Now, then, there is the internal oblique. We just simply have to pass that stitch through all these and include the aponeurosis of the external oblique. Now I shall let the ilioinguinal nerve come off to the inner side, so that it will not be disturbed at all. You see, in the Andrews imbrication operation you start right down on the outer side of Poupart's ligament,—which is clearly in view,—pick up the aponeurosis of the internal oblique, and pick up the aponeurosis of the external oblique. Now, look! I come back again and put in the next stitch: all the stitches are put in in identically the same way. See! There is Poupart's ligament all prepared. Now I have not the conjoined tendon any more: I have the fibers of the internal oblique and transversalis muscles. They are picked up with the aponeurosis of the external oblique: you see they are fixed again to Poupart's ligament. You see what the Andrews operation does—it utilizes the aponeurosis of the external oblique twice, while in the Bassini operation it is utilized but once. That is the advantage you have. Four stitches below are all one needs. That forms the floor of the new canal. Now, then, I shall tie these ligatures that go to close up the floor: all the knots will be below Poupart's ligament, and none above. See the nice approximation you get there! Now you can see that each and every knot is on the lower side. The next row of stitches will be to make up the canopy. Now we cut that ligature that was on the cord. . . . Now we shall drop the cord down into the scrotum.

Now we are ready to construct the canopy for this canal. You will see how this canopy is prepared. There is the lower part of the aponeurosis of the external oblique: I shall bring that up and attach it to the true aponeurosis. See! there it is. That makes the canopy of the canal. See what a good support you have! You have a flat canal, so that you have no danger of strangulation of your cord. This is the last stitch. All your stitches are outside. You have reconstructed your canal stronger than it was before, because you have utilized the aponeurosis of the external oblique twice. That, I think, is the best operation there is for hernia. You obliterate this dead space now by picking up these tissues, otherwise you can have a hematoma in there that would cause some annoyance. [After accounting for sponges and instruments the skin-edges were apposed and the dressing was applied.]

Postscript.—The patient made an uneventful recovery and left hospital in the regular time.

[The technic of the Andrews operation, described by Dr. Andrews and fully illustrated, was published in Vol. II, October, 1913, 756–68.]

A paper entitled "Complications and Sequelæ of the Operation for Inguinal Hernia—An Analysis of 1500 Cases at the Massachusetts General Hospital," by Lincoln Davis, was published in the *Journal of the American Medical Association,* August 12, 1916, 480–483.

CARCINOMA OF CECUM—ABLATION OF TUMOR

Summary: **Clinical history of patient; comments—location and nature of tumor; operation—ablation of neoplasm; postoperative course.**

CLINICAL HISTORY OF PATIENT

A MALE, forty-seven years of age, was admitted to Mercy Hospital September 30, 1909. The family and past histories are negative.

About one year ago the patient had some pain in the abdomen, and ever since then he has been ailing a little. He lost the color he formerly had in his face, and lost 40 or 50 pounds in weight. The pain was located in the pit of the stomach. This pain has occurred several times during the past year. The character of it is dull, but it has increased in severity since the onset.

About one week ago the patient had a spell of vomiting after taking some medicine. He has noticed no tenderness until after the doctor examined him a few days ago: the tenderness is in the iliac region, about McBurney's point. He is not aware of having had fever, except that two weeks ago he felt now hot, now cold. His color is not good, although he has never been really jaundiced. He has never passed stones, never passed or vomited blood, and never had any urinary symptoms. He has neither cough nor night-sweats. His appetite is good, and the bowels move freely. Blood is found in the stools on both chemic and microscopic examinations.

Examination by Dr. Murphy (September 27, 1909).—Although the patient refers all the symptoms to the stomach, yet there is no tumor in the pyloric zone. The stomach was dilated with a Seidlitz powder, and he retained the gas: none of it was expelled. There is a distinct neoplasm of the cecum, which is probably malignant, and which should be removed.

OPERATION OCTOBER 2, 1909

[The cecal region was exposed through a celiotomy incision. There was found a carcinoma which originated in the antero-internal portion of the cecum, and which involved the cecum alone. The tumor was excised, and two ligatures were applied to the portions of the mesentery which were disturbed when freeing the tumor. After accounting for sponges and instruments the abdomen was closed in the usual manner, and without drainage.]

POSTOPERATIVE COURSE

The patient made an uneventful recovery and left hospital on October 23d—three weeks after operation. He was next seen by Dr. Murphy on September 8, 1910. He had gained 34 pounds since the operation, and was in perfect health, except for a slight catarrhal cough. He returned for examination on June 6, 1911. He had gained 60 pounds since the operation. There was no evidence of return of the tumor. There was a good strong scar and no sign of hernia. He seemed to be in perfect health.

On December 9, 1915,—over six years after operation,—the patient returned complaining of distress after meals. One month previous to this he had an attack of pain in the upper abdomen, with a chill and some fever. His condition now suggests an infection of the gall-bladder, although he is not sore to perpendicular percussion. There is no evidence of a tumor. He was put on a diet and given some powders for his stomach.

On January 13, 1916, the patient returned, feeling much better. His color is yellow. There is no evidence of return of the tumor at this time. It is six years since he was operated upon. His present symptoms are more those of gall-bladder trouble than of anything else. He was put on some medication and ordered to return in April.

CHRONIC PERITONITIC OBSTRUCTION OF SIGMOID FLEXURE—DISSEVERANCE OF BANDS

Summary: Clinical history of patient; comments—physical findings in relation to probable cause and site of obstruction; operation—exploration of abdomen—disseverance of obstructing fibrous band; postoperative comments—citation of another case having offensive bowel movements; correction of errors in the customary nomenclature of ileus.

CLINICAL HISTORY OF PATIENT

A MALE, sixty-two years of age, by occupation a railroad agent, was admitted to Mercy Hospital April 3, 1916. The family history is negative. When twelve years of age the patient had measles, followed by pneumonia.

The chief complaint is the passage of soft, light-colored stools with a very bad odor: associated symptoms are loss of weight, weakness, and dizziness. Since the age of twenty-five years the patient has been troubled with summer diarrhea. In the latter part of August, 1889, he had a "cramping diarrhea," the bowels moving slightly every few minutes, the movements being foamy and of light reddish color: the doctors called it a "bloody flux." On the third day it responded to treatment and he felt well, but was weak.

In the latter part of 1904 the patient noticed a small swelling in the right femoral region which was not larger than half a walnut, and which became slightly tender to touch. It caused him no trouble until December 10, 1909, when, after eating a large dinner and while working on the station platform handling light freight, he had a sudden, severe, colicky pain over the whole abdomen, and a few seconds afterward vomited partially digested food. He walked home, a distance of four blocks, still vomiting frequently. The vomiting continued until 12 P. M. The doctor gave him morphin by mouth, which lessened the pain. The last vomitus was described as fecal. He had no fever, and by 4 o'clock the following morning the pain and vomiting had subsided. In the forenoon he was given an enema, which was followed by a slight bowel movement. In the afternoon he took a cathartic, and one hour later had severe pains in abdomen: he did not vomit. He immediately took more cathartic and an enema, and a few hours later had a fair movement, which gave him relief. He remained at home for one week.

On January 19, 1910, the patient was operated upon for femoral hernia: the abdomen was opened, and the doctor said that the involved loop of bowel had a gangrenous ulceration and burst in his hand. Resection and anastomosis were performed. He left hospital in seven weeks and felt well and strong. He had no fever while in hospital.

For the next five years the bowels moved regularly.

Beginning September, 1914, the patient began to notice a bad odor to the feces and the passage of bad-smelling gas. The feces were soft and light yellow in color. The bowels moved once a day, and the quantity was good: there was no pain. Haste was necessary to avoid involuntary evacuations, and the feces came with quick movement. This grew more noticeable until the fall of 1915.

In September, 1915, the patient noticed for the first time crampy pains in the abdomen, coming on about one-half to one hour before bowel movements: he says he was constantly passing bad-smelling gas. All this time he was eating heartily. He says the doctor prescribed salol for the intestinal putrefaction, and this decreased the odor for a time.

This condition continued until December 25, 1915, on which day, after eating heartily, the patient was awakened at 12 P. M. with a feeling of nausea and diffuse cramping pains over the abdomen: he then vomited a little mucus. In one-half hour he had a good bowel movement: the feces were soft and had a bad odor, but there was no blood. The next day he felt weak and sick.

On January 1, 1916, after eating heartily, the patient was awakened at 12 P. M. by an attack similar to the one he had on December 25, 1915. He was dizzy and weak. He went to stool, and while having a bowel movement, vomited some undigested food, which contained no blood. The stools were soft and light. He has never at any time noticed mucus or blood in stools. He slept until morning, then got up and went to work. He felt very weak. Since this time he has had frequent dizzy attacks, which passed away when the bowels moved.

On January 14th, at 12 P. M., the patient had a similar attack. The next morning he consulted a physician, who ordered him to stay at home. He has not worked since then, and has been on a diet of albuminous food and alkalis.

On March 21st, while sitting in a chair reading, the patient remarked to his wife that he felt sick at the stomach, and in a few minutes vomited a tablespoonful of food: then he staggered to toilet and the bowels moved profusely. The stools were soft and of a light color, with a bad odor: mucus and blood were absent. He went to bed and vomited, at first every fifteen minutes, and then every thirty minutes until 1.30 A. M.: the vomitus contained both his dinner and supper, which consisted of rice, prunes, milk, broth, toast, and peptonoids—all undigested. He remained in bed that day, taking only lime-water and milk.

On April 23d the patient went to a hospital and was examined. Test-meals were given, and opaque-meal skiagrams were taken (see report of findings below). The doctor said the stomach was in good condition, except for slight hypermotility. The opaque-meal skiagram showed an obstruction at the splenic flexure of the colon. There was occult blood in stools.

Since the patient was at the hospital his appetite has been good, but he still feels weak. One year ago he weighed 143 pounds: on March 24, 1916, he weighed 116 pounds; he has lost about 25 pounds since January, 1916. He has never had fever or chills.

The findings during the patient's stay in hospital in March, 1916, were as follows:

Hemoglobin, 70 per cent.; erythrocytes, 4,980,000; leukocytes, 4000—polymorphs, 65 per cent.; lymphocytes, 25 per cent., large lymphocytes, 3 per cent.; large mononuclears, 1 per cent.; transitionals, 4 per cent.; basophils, 1 per cent.; myelocytes, 1 per cent. The red cells were of normal shape, size, and staining reaction.

The stool which followed the castor oil contained no blood macroscopically, but blood-cells microscopically, and chemically a strong reaction for blood was present: the latter was again found on two successive days, even in the bismuth, which alone was expelled from the bowels.

After two test-breakfasts only 2 or 3 c.c. were recovered in forty-five minutes: examination revealed no free acid, and Myers's test was negative. In thirty minutes about 20 c.c. were obtained: examination revealed total acidity of 16; free HCl, 4; no blood; microscopically negative.

Fluoroscopic examination following the bismuth meal revealed a normal stomach without evidence of obstruction or filling defects, as from an ulcer: strong peristaltic waves were seen, and there was complete emptying at the end of six hours.

Colonic bismuth injections revealed a dense shadow, which stopped abruptly at the splenic flexure, and no amount of pressure was successful in sending it beyond. In addition to a peculiarly resistant abdomen, tenderness was elicited in the left hypochondrium, but no definite mass could be felt. The blood-pressure is normal; the urine, negative.

In view of the symptoms, history, and laboratory findings the attending physician felt that the diagnosis of carcinoma of the splenic flexure of the colon was justified.

Examination by Dr. Murphy (April 3, 1916).—Examination with the high proctoscope showed no blood or mucus anywhere in the intestine. The lesion is an intestinal obstruction—probably carcinomatous.

COMMENTS

DR. MURPHY (April 4, 1916): In reviewing this case there are two elements to be taken into consideration: one is that no tumor is in evidence anywhere. The skiagram shows an obstruction to the bismuth—coming down from above and coming up from below—at the splenic flexure. The story is that of a lesion of the intestine: the question is, Has he developed stenosis, and has he carcinoma? There is no occasion for his passing offensive stools—which you notice is mentioned specifically here and there throughout the history—if he has stenosis from resection. The description of the operation does not state that the doctor made a complete resection. It appears that the patient had a partial strangulation—that a knuckle of gut slipped into the sac, but did not produce complete obstruction; that when the surgeon took the bowel into his hand it ruptured; that he removed the gangrenous portion parallel with the long axis of the bowel and from its side. That is the story as the patient gave it to us.

OPERATION

[Celiotomy incision through right rectus muscle. . . . Retraction of wound. . . . Exploration of abdomen.] . . . Here is the splenic flexure: there is no obstruction at that point, nor is there any evidence of dilatation from an obstruction above. . . . The caput coli is enormously dilated. The question arises, Is there something in between these two points that is producing an obstruction? Here is the ileum. Here is an enlarged lymph-node. There is the appendix: nothing is wrong with it. There is the gall-bladder. Examination of the stomach by laboratory methods was negative: the pylorus shows hyperplasia of the musculature, but no evidence of ulceration. . . . Here is the sigmoid flexure of the colon: there is no dilatation, showing that there is no carcinoma below. I shall follow it up to see whether there is a carcinoma above. . . . There is a band, you see, which has become organic and firm: I shall dissever it and then sew a flap of omentum in between its cut ends, so that they cannot reunite—otherwise the trouble will recur. . . . You can see how nicely that omentum falls in and blocks it. . . . Now we shall look over his pancreas. . . .

Let the record show that the head of the pancreas is not thickened.

Let us look at the small intestine down in this zone to see if there is anything here the sequence of the previous operation.

. . . No; there is no dilatation: the small intestine is small everywhere, so that there is no continued obstruction. If he had a continued obstruction he would have it at the place where the previous operation was performed. The previous operator did not make a complete resection of bowel, but took a piece out from the side. There is no evidence of stenosis or obstruction of the small bowel. [After accounting for sponges and instruments the celiotomy wound was closed in the usual manner.]

Recapitulation.—Let the record show that the obstruction in the splenic flexure was due to the formation of peritoneal bands; that we inspected the field where the previous operation had been performed, and it showed the intestine to be in splendid condition—not at all contracted: it showed that the side of the small intestine had been removed, but that there had not been a complete resection, corresponding with the patient's description; there was no ulcer of the duodenum nor any lesion of the stomach; there was a very great dilatation of the caput coli below these bands.

POSTOPERATIVE COMMENTS

We had another case in yesterday with these offensive bowel movements, which were due to retention of feces in the lower bowel, even after a copious defecation. He came in complaining specifically about the odor: the gas that escaped from the bowel was always offensive. He noticed the odor between bowel movements. His sphincter ani seemed to be of a peculiar type: it seemed to be 1½ inches long, and it did not amputate the fecal mass as it came down, but left a tube of feces in that portion of the bowel; a little of it gradually came out and soiled his clothing. After his bowels had moved and after he had washed, the odor still continued. The odor was that peculiarly offensive odor that one gets in carcinoma, but it was not a case of carcinoma at all.

I cannot quite understand why the medical profession continues to use the term *dynamic ileus* for the paralytic variety. Years ago—and long before the term dynamic ileus was used in the medical literature—we classified ileus into *adynamic*, *dy-*

namic, and *mechanical*, and still one is hearing *dynamic* ileus in connection with hemiplegia, spinal injuries, peritonitis, etc. The reason for the coprostasis in this class of cases is the fact that peristalsis has ceased. It is *adynamic* without the power of contraction of the muscular apparatus which propels the intestinal contents—differing entirely from the dynamic type, where the power is excessive, as in lead colic, tyrotoxicon poisoning, etc. Let us hope that the profession will standardize these expressions, so that one will know at once what is meant, and that the name will have some relation to the etiology.

LARGE MULTILOCULAR OVARIAN CYST OF EXCEPTIONALLY RAPID GROWTH—ABLATION OF CYST

Summary: Clinical history of patient; comments—differential diagnosis between ovarian cyst and pregnancy; operation—discussion of diagnosis based on operative findings; ablation of cyst; danger of cutting into bladder when it is pulled up out of position; exceptionally rapid growth of cyst.

CLINICAL HISTORY OF PATIENT

THE patient, thirty-eight years of age, was admitted to Mercy Hospital September 23, 1915. The family history is negative. The patient has had the usual diseases of childhood. Menstruation began at fifteen: it has been regular, and of the twenty-eight-day type until July, 1915, since which time she has menstruated twice a month. The latest mensis was September 11, 1915. She has no pain with menstruation.

The chief complaint is discomfort in lower portion of abdomen. For the past three or four years the patient has had attacks of severe headaches, accompanied by vomiting, coming on twice a week. About the latter part of June, 1915, after eating a heavy meal of meat, she had a sensation of fullness and distention at the cardiac end of the stomach: she says it felt as though she had swallowed half an apple and it had stuck there. Since that time this sensation has been present after meals, resulting in a constant sore feeling. She has had no pain, nausea, or vomiting, and the distended feeling bears no relation to the particular kind of food taken.

Three weeks ago the patient consulted a doctor because of the stomach symptoms, and he said she had a dilated stomach. There has been a gradual increase in the size of the abdomen, which she attributed to the fact that she had gained in weight: in the past week it has enlarged rapidly, being one-third larger than formerly. There is a sensation of distention in the abdomen, but no tenderness and no pulsation. She has had no chills or fever.

Examination by Dr. Murphy (September 23, 1915).—The uterus is small and displaceable: it may be displaced up against the symphysis. Close to the fundus there seems to be a small, firm nodule. All the pelvic organs are drawn up into the abdomen. There appears to be a cyst extending clear up to the costal arch. The hymen is extremely closely intact, and a full examination is difficult, but the uterus itself does not appear to be at all enlarged. It is larger on the left than on the right. It is clearly a circumscribed cystic mass with, apparently, nodules around it. The fluid is not free in the peritoneal cavity. From the rapid growth we fear malignancy. Examination of the urine was negative.

COMMENTS

Dr. Murphy (September 25, 1915): This story does not fit. What is the matter with her?

Intern: I should think of a cyst.

I should not, although it is written on the board. The first thing I should think of is pregnancy, and I should think of it several times—notwithstanding she is menstruating more than ever before. That is the reason you should think of it. She says she had no enlargement until three weeks ago. I do not believe it. She is as large now as an eight months' pregnancy (Fig. 203). The symptoms do not fit. When you see this abdomen you will see the justice of making that history fit the physical findings. She has an abdomen large enough for a pregnancy. Now, against the physical findings, for pregnancy, the hymen is superlatively intact, there is a small cervix of the uterus, and the uterus is movable.

OPERATION

[Through a celiotomy incision the pelvis was exposed and a large cyst brought to view.] . . . See what I told you! The size of the cyst is exactly in consonance with what I said about the impossibility of its attaining so large a size in so short a time as the patient stated (three weeks) unless there had been rotation of its pedicle, or unless it had become strangulated. It is apparently a circumscribed cyst, for when she took a deep breath I could get my hand in between the costal arch and the tumor. When I rotated her from side to side it retained its rotundity, instead of altering its shape. There is no history—such as sudden pain, nausea and vomiting, or fever—to justify the diagnosis of a cyst strangulated from rotation on its pedicle, nor are there any symptoms to justify the diagnosis of sarcoma. I made the diagnosis of a cyst in the pelvis. I recall one of these cysts that I saw with Dr. Ederboltz: he had a beautiful big tumor that looked exactly like an ovarian cyst—it was a kidney. That shows you what can occur.

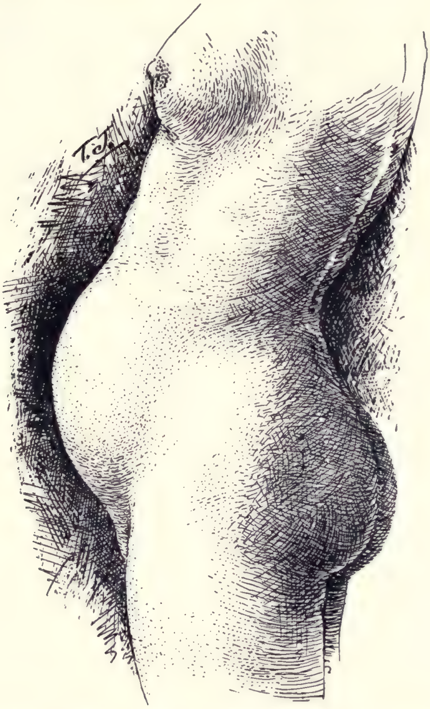

Fig. 203.—Simulation of eight months' pregnancy by large multilocular ovarian cyst.

The blood findings here were normal. We did not make an Abderhalden test, because the hymen is superlatively intact. The uterus is small. There is no change in the vulva and no change in the breast. We have used the Abderhalden test to decided advantage in cases where we were in doubt—particularly in cases of pregnancy associated with fibromyoma of the uterus. The uterus is higher up than normal, as though drawn up by something. We took into consideration the matter of tuberculosis: with tuberculosis you can have a circumscribed mass with free fluid. You may have a single cyst or you may have multiple cysts.

She was catheterized: we often catheterize these cases, because the bladder is often pulled up out of position. Some of you will recall that right in this amphitheater, when making the celiotomy incision, one of the foremost gynecologists in the world cut square into the bladder.

This is an ovarian cyst and enormous in size: there are no adhesions any place that I can feel. There is a grumous material that you sometimes see in these cysts.

[Clamps broad ligament and removes the cyst.] . . . Now I shall tie a ligature into the crease made by this clamp, so that there will be no possibility of this stump leaking. The whole stump must be tucked in. [After accounting for sponges and instruments, the celiotomy incision was closed without drainage.]

Recapitulation.—Let the record show that this was a large, multilocular ovarian cyst; the other ovary is all right and of normal size; the uterus is small; there is no inflammatory condition. Let the record show further that the patient's statements in the history are the same as we estimated—not true; she endeavored to tell the truth, but it was not the truth just the same, because no tumor of that size could grow in three weeks; there was no twisting of the pedicle, no evidence of malignancy, no blood in the free peritoneal cavity; some of the cystic fluid was clear, and some cloudy and grumous.

Postscript.—The stitches were removed on October 5th. The wound healed *per primam intentionem.*

LIPOMA OF LABIUM—ABLATION

Summary: Clinical history of patient; comments—diagnostic dialogue with intern; anatomy of Bartholin's gland and its duct; the pathogenesis of a cyst of the gland; lesions that affect Bartholin's gland; operation—points to observe when removing a tumor from the labium; a lipoma encountered and ablated; significance of a fatty tumor in the labium.

CLINICAL HISTORY OF PATIENT

THE patient, twenty-five years of age, by occupation a milliner, was admitted to Mercy Hospital January 14, 1916. The family history reveals that the patient's mother died from tuberculosis at the age of twenty-four years. The patient's past history is negative. Menstruation began at fifteen, is regular, of the twenty-eight-day type, and lasts from three to four days. She has a backache before the period, but no pain during the period. The flow is profuse and requires from six to eight napkins a day. The latest mensis occurred December 23, 1915.

The chief complaint is a tumor in the right labium majus. In April, 1915, the patient noticed for the first time a small tumor the size of a hazelnut at the site of Bartholin's gland on the right side: she felt tired and run down at that time. There was no pain, discharge, or elevation of temperature. The part was not inflamed. The mass fluctuated. It increased in size so that she noticed it from month to month. It has never broken down or discharged.

At present the tumor is the size of a large pecan-nut. The patient has no pain, but feels a weakness-discomfort in that part.

Examination by Dr. Murphy (January 12, 1916).—The abdomen is perfectly flat: there is no enlargement or swelling of any kind. There is a retention cyst of the right Bartholin gland (Fig. 204). Examination of the urine is negative.

COMMENTS

Dr. Murphy (January 15, 1916): What is the matter with her?

Intern: She has a cyst of the right Bartholin gland.

What makes you think so?

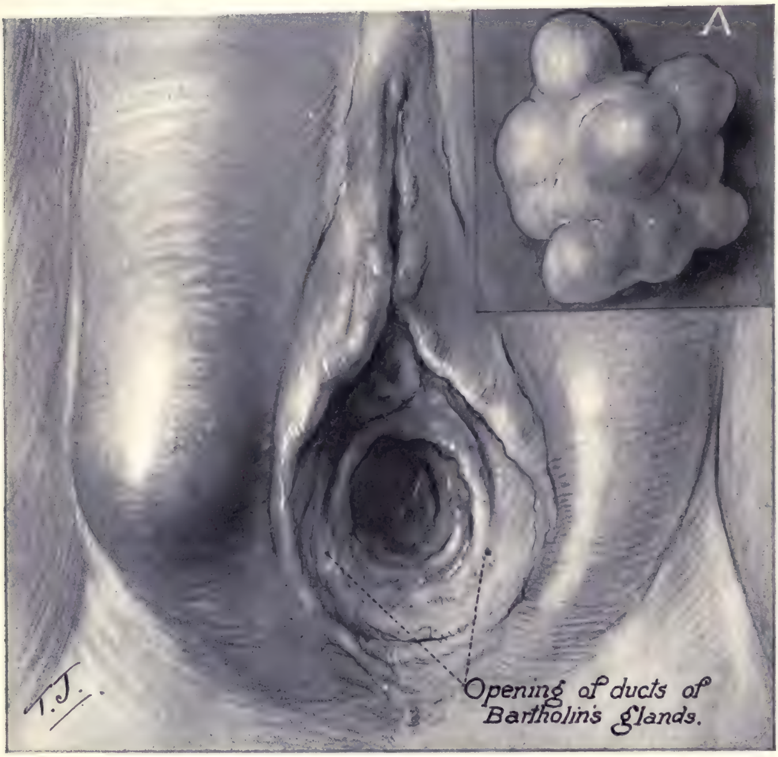

Fig. 204.—Shows tumor of right labium majus. Insert *A* gives appearance of lipoma after removal.

From her description of the tumor.

I think she has a suppuration.

She says she has had no pain, no discharge, no fever.

No discharge from where?

From the vagina.

Did she ever have burning-discomfort with urination?

I did not ask her.

The commonest cause of closure of the Bartholin gland is a Neisserian infection, and the commonest symptom that is indicative of a Neisserian infection is burning-discomfort with urination. I have just as much right to consider it a suppuration as the doctor has to consider it a cyst, because he did not clear it up in the history. My interpretation of it is that it is a cyst, because she never did have any burning with urination, but the history should state that. What is the size of the Bartholin gland?

Normally it is about the size of a small bean.

Yes. Where does its duct open?

It opens upon the floor of the vestibule, in the angle between the attached border of the labium minus and the vaginal opening.

The duct passes downward and backward. It is a source of considerable trouble, when one takes into the estimate that it seems to have so little function. Remember, it is much larger in infancy. It is largest at the seventh to the ninth month of gestation: it remains large until the fourth or fifth year of postnatal life, and then begins to diminish in size, unless the duct should become closed. When the duct becomes closed, there arises a condition similar to that in the galactophorous cysts—you have a retention cyst, and that retention cyst may attain quite a great size: it can become as large as a baseball. If the duct remains closed, the cells which originally produced a thin, milky fluid now produce a pinkish-white fluid in very small quantities; and when these cells flatten by the pressure from within, it changes to a serous fluid and then increases in quantity—just like the dilated pelvis of the ureter. You know this, that as a cystic kidney dilates you can have a very large quantity of urine coming out, but no urea. Why? Because the parenchymatous cells are altered. The same principle holds for all expansion-cysts.

The lesions that occur in this gland are, first, cysts; secondly, abscesses; thirdly, adenocarcinomata. These are the three principal lesions. Sarcoma practically never appears in this relationship, because of the small quantity of connective tissue. It is a racemose gland—even in its small size—and typically grape-like in its structure.

OPERATION

You see there is the labial margin. See the duct right there! I am unable to press any fluid out of it. That is the direction the duct takes [indicating]. In removing the cyst you cut on the inside of the labial margin so as to leave the scar on the margin. One must dissect out the entire gland. We were unable to press anything out of its duct at the office: there does not seem to be anything pressed out of it. There, you see, is the little duct: make your incision along in this line onto the capsule. When the cyst attains a large size, you have quite a dissection to make. You see, you have a plexus of veins, which often gives one a great deal of trouble in the way of hemorrhage: when cut, they bleed and bleed, and unless you are careful you have the matter of a hematoma to reckon with when the work is complete. I am going down to the capsule . . . When I get onto the capsule, then my work will be comparatively easy.

When you look at this mass of tissue now you would say it is a fibrolipoma as it appears (Fig. 204, *A*). It is a lipoma. It is not the gland itself. The gland is swung out in identically the same manner as this is swung out. Another matter about the management of lipomata—if you leave behind any portion of the capsule you will have a return of the tumor. Doctor, if this is a lipoma, what can it connect with above? What is one of the things you want to think about if you take out a lipoma of the labium?

Omentum in the sac of a hernia, or septum crurale.

Yes. What does that lipoma lead out to? The femoral ring, and occasionally it incloses the sac of a femoral hernia which descends and becomes a labial hernia. You noticed as I went up I began to estimate as to whether this mass contained a hernial sac. It is a pure lipoma, and there is no gland in it at all: it feels hard and nodular, but it is not a gland. These [demonstrating] are diverticula of the lipoma. This is the properitoneal fat that comes down from the femoral tract,—rarely ever from the inguinal tract,—but it can come from the inguinal tract, just the same as one has a scrotal hernia in a male. We thought that was a gland, because it was so near to the mucosa of the vagina that it looked identically like a cyst of the gland. She had no history of an infection which should give that closure of the gland, which is the commonest type of tumor one meets with here.

In ablating such a tumor, ligate all bleeding points, just the same as you do when performing thyroidectomy: if you do not, you will have a hematoma as large as your fist following the operation. Tie every little vein,—in order to prevent the accumulation of blood,—and you will save much time in the process of repair. The type of stitch which you put in here is just a submucous stitch. Make an ectropion of the cut edge of the mucosa, and do not suture the mucosa at all.

Postscript.—The stitches were removed on January 21, 1916. There was a little hematoma. The patient was permitted to go home.

URETHRAL CARUNCLE—ABLATION

Summary: **Clinical history of patient; comments—types of tumors that occur in female urethra; Gartner's duct—its anatomy and relation to multiple linear tubulocysts of vagina; urethral caruncle usually superficially treated and then is liable to recur; operation—ablation.**

CLINICAL HISTORY OF PATIENT

A MATRON, fifty-four years of age, was admitted to Mercy Hospital December 17, 1915. The family and past histories are negative.

In December, 1914, the patient noticed for the first time a small growth, blood-red in color, at the external urethral orifice. The growth has given rise to bleeding on four different occasions, but never to more than an oozing, and only once to as much as half a dram: a burning sensation in the growth has preceded each occurrence of bleeding. The growth has never been painful: it has gradually grown until now it is about the size of a lima-bean.

COMMENTS

DR. MURPHY (December 18, 1915): What is the matter with the patient?

INTERN: She has a growth in the urethra.

What is the nature of the growth?

It is known as a urethral caruncle.

What are the tumors that appear in the female urethra?

They are divisible into the benign and the malignant.

The commonest tumor of the female urethra is a caruncle, or papilloma—in other words, a mucous-membrane wart. The next in frequency is carcinoma; and there are also fibromyomata, which may appear anywhere from the external urethral meatus along the vaginal wall to the neck of the uterus, and involving the uterus itself. Fibromyomata arise from the unstriped muscle of the vaginal wall—usually the posterior: they commonly appear as polypoid tumors of medium size, but when growing diffusely are found to be adenomyomata, probably originating in Gartner's duct (Graves). Sarcoma of the urethra does occur, but is a great rarity. In addition to these solid tumors, cysts of the vaginal wall occur, which, when small and irregularly placed (usually on the anterior wall, and single), are probably derived from gland-inclusions formed by infoldings of the mucous membrane in fetal life and in later life from perineal lacerations; while when larger, multiple, and occurring in a line they are supposed to originate as tubulocysts from Gartner's duct,* in which case they are lined with a single layer of low, cuboidal epithelial cells. Sometimes the larger cysts extend inward and upward between the layers of the broad ligament.

The tumor with which we have to deal today, then, is the commonest and most frequent neoplasm of the female urethra, as well as the most annoying lesion that occurs about the vulva—annoying both to the patient and to the physician who later observes it. What do I mean? I mean that caruncles of the female urethra are more carelessly treated than any other lesion that occurs about the vulva: they are snipped off, pulled off, and occasionally cut off, but unless one ablates the basement membrane from which they sprang, they recur again and again, just like a wart of the skin. We have all had these patients coming to the office over a period of ten, twelve, or fifteen years with return of the growth in the urethra. There is but one way to treat a caruncle of the urethra successfully, and that is to expose the base from which it sprang and ablate the whole base, just as one would excise or destroy the whole base of a cutaneous wart, and then cauterize the base. Urethral caruncles are very much more persistent in their regularity of recurrence than are warts.

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* Gartner's duct, when present, is the prolongation of the common longitudinal canal of the epoöphoron, and thus a persistent portion of the Wolffian duct, which in the male gives rise *inter alia* to the duct of the epididymis. Since in the indifferent stage the Wolffian duct opens into the cloaca *in front of* the Müllerian duct (the two Müllerian ducts fusing to form the vagina below, the uterus in the middle, but remaining separate above to form the Fallopian tubes), and since the epoöphoron is situated in the mesosalpinx, it is not hard to orientate the course of Gartner's duct: thus, beginning above, where it is continuous with the epoöphoron, the duct passes downward between the layers of the broad ligament, in front of the uterus and vagina, and behind the bladder and urethra, to end at the vestibule in a cecum. There is, of course, a Gartner's duct on each side of the body, so that the two ducts course downward on each side of the midline. From this explanation the origin of the cases cited by Kiwisch and Veit, in which a row of cysts was distributed in line along the anterior vaginal wall on either side, is easily understood. "A fluctuating sac was found extending from the vault of the vagina on the left side close to the cervix, down along the anterolateral wall (of the vagina) to the vestibule, to the left of and on a level with the posterior urethral wall, where it shortly opened spontaneously, discharging pus. A probe could be passed through the external orifice clear up to the vault of the vagina, but not beyond." This will doubtless be recognized by the reader as a case of abscess of Gartner's canal, and was cited as such by Kelly ("Operative Gynecology").

OPERATION

(The operation for urethral caruncle was described in Vol. **V**, February, 1916, 47, and the steps of the operation were illustrated, *ibid.*, p. 46.)

PROLAPSE OF URETHRAL WALL—PLASTIC RESECTION

Summary: Clinical history of patient; comments—review of previous operation; *status præsens;* result of previous operation; operation—resection of mucosa and V-shaped plastic; postoperative course—venous oozing from suture line controlled by *plus* pressure.

CLINICAL HISTORY OF PATIENT

A FEMALE, twenty-seven years of age, was admitted to Mercy Hospital June 16, 1914. The family history is negative. Eleven years ago the patient suffered from tuberculous lymphadenitis on the left side of the neck; seven years ago, from pneumonia; and three years ago complete hysterectomy was performed.

In the spring of 1912, while the patient was out horseback riding, the horse shied, and she was thrown forward on the horn of the saddle, striking the urethra and symphysis pubis. There was a sickening pain for about six months and some swelling, but she did not consult a physician. At that time she had very little pain on urination, but the pain came when she attempted to ride again. There was an aching when the bladder was distended, and also at the symphysis pubis when walking: it seemed to radiate to the left hip, which was painful on pressure. She was never troubled by incontinence or dribbling of urine.

This trouble continued until the fall of 1912, when a doctor was consulted and an operation performed, but she does not know what was done: at any rate, it did not relieve the trouble. She then went back to work and the pain continued.

On February 14, 1913, the patient was again operated upon: a "growth" was removed from the urethra and a new urethra made; the growth was found to be benign.

The patient had no further trouble until May 8, 1914, when she noticed yellowish pus coming from the vagina, without odor, and this had continued to the present time. For about one week at the beginning very little pus came from the urethra, but there is none now. This never caused pain. She does not know whether or not the growth in the urethra has returned.

COMMENTS

DR. MURPHY (June 17, 1914): That does not correspond with the statement she made to me. She had a resection of a considerable portion of the urethra—including a portion of the sphincter—in California. She has full vesical control. What she came in complaining of now was this irritation from the rubbing against the upper half of the urethra, which was not taken out. She did not come to me about the discharge from the vagina: she came to me because she has so much irritation from the exposed half of the urethra, as she should have. Everything that touches the urethra hurts—just like putting your finger in the eye. The lower half has been cut out entirely; the upper half was left remaining *in situ*. The sequence is just the sequence that might be expected from that type of operation. In taking out the urethra the doctor got a splendid result as far as control is concerned—a perfect result. She has full continence all the time—which is a very desirable thing to get after resection of the urethra. I think in resecting the urethra he took out the entire floor, which is the wise thing to do, but I must say that it takes a lot of courage to go in and take out the floor of the bladder.

OPERATION

In performing this operation I am not going to interfere with the sphincter in any way. There it is. See that urethra! See the right surface of the urethra as it shows up! That cannot be permitted to stay there without giving her very great pain: it is like taking out the front portion of the eyelid and leaving the back portion—the conjunctiva—exposed constantly to irritation. See! It extends away from here to here. It seems to me that there is some urinary leakage there, although she says not: the retractor is wet each time I bring it out. She must be under the anesthetic before I begin: in that position the sensitiveness lasts longer than in any other except the anus.

Now, you see, I have mapped out the place I wish to remove. I am just taking out the mucous-membrane covering—that is all that is necessary. I am taking out the termination of the nerve-filaments. I have planned these stitches just so as to be able to take out that triangular portion of the urethra. . . . Now we are ready to amputate this portion of the urethra.

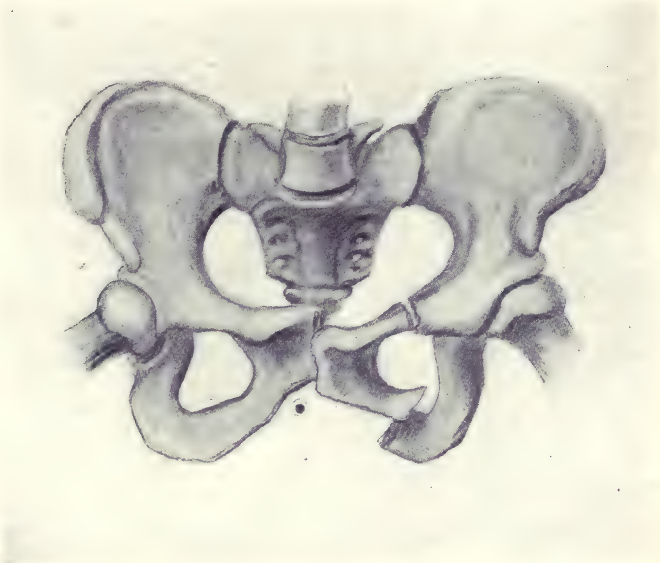

Fig. 205.—Diagram showing the fracture with resulting deformity (Hugh Cabot in *Annals of Surgery*, January, 1909, 87–90.)

Recapitulation.—Let the record show that there was a zone of the urethra exposed as a sequence of the removal of the lower half; we mapped it out with forceps, resected the mucous membrane, and then sutured a V-shaped piece over it, so that it would be fully protected.

POSTOPERATIVE COURSE

Dr. Murphy (June 18, 1914): This patient was operated upon yesterday. Resection of the urethra was performed. We got into the corpus spongiosum and there has been an oozing into the urethra, so that I have to sew it: this oozing is taking place into the urethra where I turned it in.

Let the record show that there is no blood in the bladder at all: it is all outside.

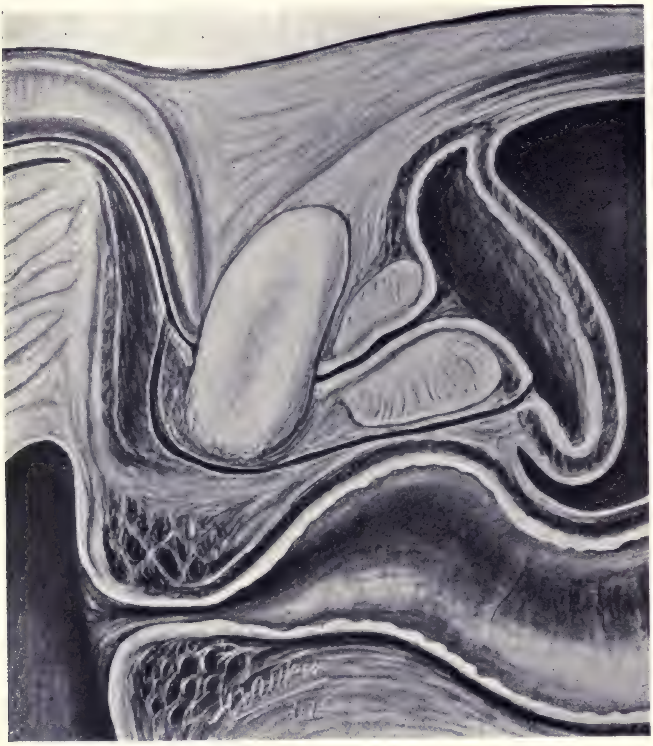

Fig. 206.—Note the position of the retracted ends of the urethra and the relations of the false passage (Hugh Cabot in *Annals of Surgery*, January, 1909, 87–90).

That is a venous oozing: all you need to control it is a plus pressure. See! It has stopped with just a plus pressure.

Let the record show that there was an oozing from the line of suture; there was no bleeding into the bladder: all the bleeding was on the outside.

The accompanying cuts (Figs. 205, 206, 207, 208) illustrate a paper entitled "Restoration of the Perineal Portion of the Urethra after Destruction by Fracture of the Pelvis," by Hugh Cabot (*Annals of Surgery*, January, 1909, 87–90). In his comments Cabot says: "This case is interesting chiefly as showing the extent to which the perineal and scrotal portions of the urethra can be mobilized without damage to their blood-supply, and the size of the defects which may thus be bridged. The distance be-

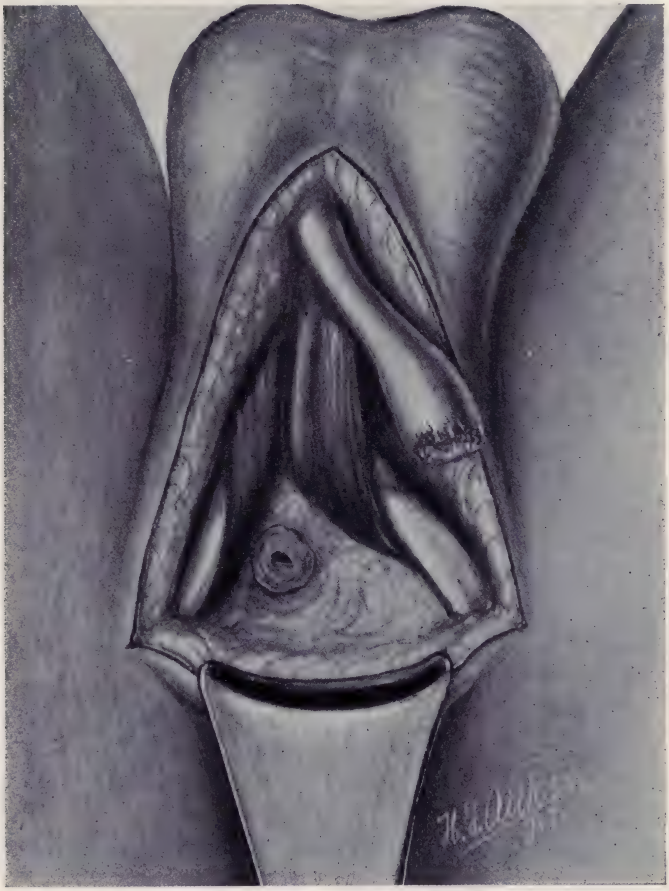

Fig. 207.—Showing the amount of mobilization of the anterior urethra (Hugh Cabot in *Annals of Surgery*, January, 1909, 87–90).

tween the ends of the urethra at the time of operation was fully two inches. Mobilization of the prostate probably diminished this space at least one-half inch, so that the gap ultimately filled was about one and a half inches. . . .

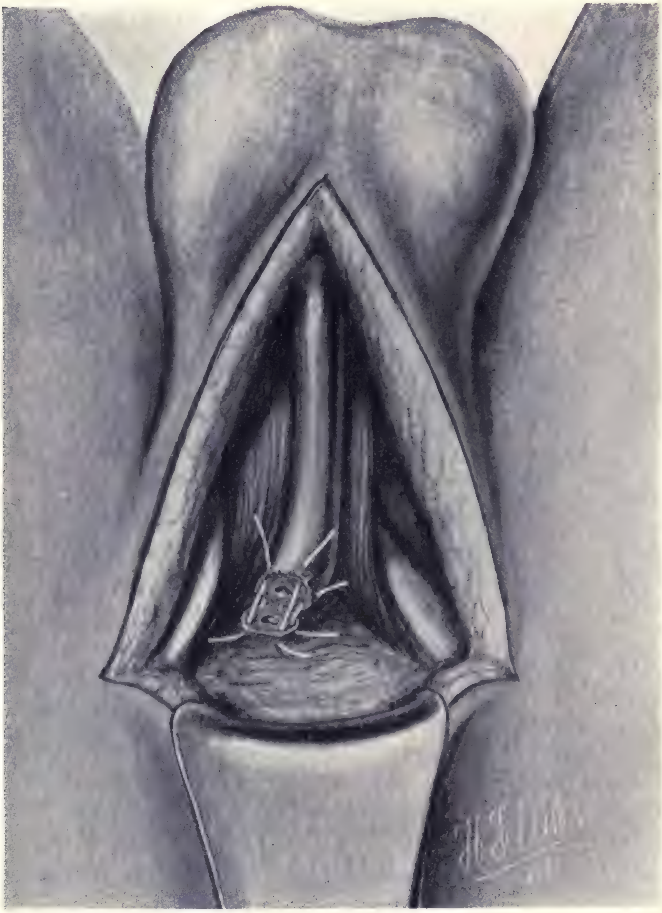

Fig. 208.—Showing method of suture (Hugh Cabot in *Annals of Surgery*, January, 1909, 87–90).

"Success in thus bridging defects will depend largely upon the approximation of the divided ends without tension. If this cannot be done, retraction will certainly follow, and a long fibrous stricture will result. The possibility of avoiding tension depends entirely upon free mobilization of the anterior segment, and in my own cases, at least, difficulties in the past have depended upon failure to observe this precaution, because I feared to cut off the blood-supply. If union takes place without stretching of the scar, an annular stricture, which can be readily handled by dilatation, will result.

"This method of restoring defects seems to me much superior to the use of animal tissue or to Thiersch grafting. Where the former method is used it is not likely that all of them will 'take,' and the amount of scar tissue is therefore greater than that following direct suture."

(Further information on these subjects will be found in Dr. Murphy's paper, entitled "Traumatisms of the Urinary Tract," *The Railway Surgeon.*)

CICATRICIAL OBSTRUCTION AT BLADDER OUTLET—SUPRAPUBIC CYSTOTOMY AND PLASTIC

Summary: Clinical history of patient; comments—care in using both catheter and cystoscope; operation—suprapubic cystotomy with plastic on internal urinary meatus; postoperative comments—importance of covering field with boric acid after operations upon bladder; callous ulcer of bladder.

CLINICAL HISTORY OF PATIENT

A MALE, forty-three years of age, was admitted to Mercy Hospital November 3, 1915. The family history is negative. When eighteen years of age, the patient had an attack of gonorrhea, from which he made a good recovery.

About two years ago the patient began for the first time to get up at night to urinate: he could attribute no cause to this trouble. There was no blood in the urine. Thereafter the urinations became more frequent in the daytime. After some weeks the urine would pass before he had time to get to toilet: this occurred during the day as well as at night. The doctor said there was some disease in the bladder, which involved the urethral sphincter.

On January 10, 1914, the patient was operated upon: some tissue in the region of the urethral opening of the bladder was removed. Examination of this tissue showed no cancer. He was in hospital three weeks. Since the operation the suprapubic opening in the bladder has never closed entirely. For three months all the urine passed out through this opening.

Since the first operation Young's punch has been used three times, pieces of tissue being removed each time.

The patient's condition has not been improved. Some of the urine still comes out through the suprapubic opening. He cannot empty the bladder by urinating normally: he uses a catheter every night to draw off five or six ounces of residual urine. His general health remains good.

Examination of the urine on October 20th showed the microscopic field packed with pus-cells: there were many red cells present. Albumin was present, but no sugar. A piece of the tissue that was removed at the previous operation was brought in and examined by the pathologist: it showed a proliferating epithelioma of the prostate gland. In places there was a small round-cell infiltration. It was reported as an adenopapilloma of the prostate gland.

Examination by Dr. Murphy (October 20, 1915).—On palpation a hard, wood-like mass can be felt, which seems to involve all the wall of the bladder. There is no calculus that can be located with the sound. There appears to be no obstruction to the passage of the sound, and there is no infiltration in the neighborhood of the base of the bladder—nothing at all to indicate malignancy and nothing to indicate obstruction. No prostate gland could be felt, and it appeared as though the organ had been removed.

Upon admission to hospital the patient was put on urotropin and sodium phosphate preparatory to the operation.

COMMENTS

DR. MURPHY (November 16, 1915): The patient comes here with an obstruction in the prostatic zone of the bladder. I do not know what the original operation was, but an analysis of this case shows you that a cystoscopic examination is not such an instructive thing as we think it is. For many years we have had a very strong feeling about the indiscriminate use of the catheter, so that when we use a catheter we take all the precautions that we take when performing celiotomy. The use of the cystoscope properly applied you would say is free from danger—yes, if you use it properly. The question is, what does "properly" mean? The urethra is one of the most dangerous zones of the entire anatomy for infection. This patient was in fairly good condition until they made a cystoscopic examination. Then he had an infection followed by an operation, and then he had three subsequent operations. This is my first examination. I am going to open the bladder and inspect it.

OPERATION

[Catheter passed *per urethram* into bladder.] . . . That catheter seems to go into his bladder without any trouble at all: why he is unable to empty his bladder I just cannot understand. [Laparotomy incision for suprapubic cystotomy made.] . . . I am down to the space of Retzius, but I do not seem to be in the bladder. I shall see if I can find a tract to the bladder. About the bladder I can palpate cicatricial tissue, which is as hard as wood. Now we do not know just how the peritoneum is affected by this cicatricial tissue: we must exercise great care in handling it so as to endeavor not to open the peritoneum, which is exposed to greater risk in this class of cases. I want to detach the whole sinus from the anterior abdominal wall, so as to have it mobilized. You see we have no anatomic landmarks there at all when I get close to the scar tissue, for the normal tissues have been infiltrated by the years of this sinus formation. . . . Now I have detached the adherent cicatricial-tissue mass from the symphysis pubis. There, I take it, is the wall of the bladder: there is the sound shining through. I have been working with all that caution because I did not know where the bladder was. [Inserts anchor stitches into bladder.] . . . This is the plan we have used since the very beginning of our bladder surgery. When I divide the bladder, I divide it in between the two anchor stitches, so that in any work I do subsequently I do not get into the bladder nor into this large fatty space. We open the bladder directly onto the sound, always keeping anteriorly so as to run less risk of injury to the peritoneum. . . . Now I am ready to inspect the bladder.

Let the record show that the inside of the bladder looks perfectly clear; the ureteral opening on the right side is dilated, but not more congested than the remaining portion of the bladder; the left ureter is not particularly enlarged; there is no neoplasm; but here is a record of this stenosis due to a cicatricial formation around the mouth of the urethra: it is scar tissue around the mouth of the urethra.

I am going to split it anteriorly in place of transversely, so as to give him a fissure through which he will pass his urine: merely stretching it will not help. What I have to do now is a plastic on the outlet of the bladder. I want to split that fold clear up and sew the mucosa edges together. If I can do that, I can help him. There is the fold: that is what does the mischief. . . . Now, you see, I have split it: what I want to do is make these two mucosa surfaces go across in this way, like you do in curing web fingers. . . . I split it so as to prevent it from reuniting: you see I have divided it and sutured it across. It makes a great opening. If that does not stay open, nothing will stay open. There is no neoplasm of the bladder. The prostate does not seem enlarged for his age. There is the edge of the bladder-wall. There is my anchor stitch. I shall put this stitch in, then I shall take out my anchor stitch. I am now turning the mucosa in so as to get the muscularis. . . . Now I am putting in this stitch: if that were the intestine, I would call it a Lembert stitch, but it just includes the upper portion of the muscularis of the bladder, so as to turn that in and lessen the liability of an elongation which might subsequently fold posteriorly. In this case the fistula is not due to the elongation of the mucosa forward: it is maintained by the obstruction. If there were no obstruction, you could not keep that fistula open. Where you have a fistula of the urinary bladder or a fistula of the gall-bladder, you cannot close these fistulæ until you have removed the obstruction. [Catheter passed through bladder into urethra; drain placed in space of Retzius; laparotomy incision closed in usual manner, after accounting for sponges and instruments.]

Recapitulation.—Let the record show that we first succeeded in freeing the fistula down to the bladder; then we detached the cicatricial tissue of the fistula from the bladder and opened the bladder on one side, carefully observing the relationship of the fundus of the bladder, so as not to get into the peritoneum. Let the record show further that on inspecting the interior of the bladder we found a trap-door of cicatricial tissue at the internal urinary meatus; this trap-door was carefully examined on the sound; it was split in the middle for a distance of three-fourths of an inch; when it was split for the whole distance, then the mucous membrane folds were sutured so that the mucous membrane of the bladder-wall and that of the urethra were turned to each other so as to obliterate this trap.

POSTOPERATIVE COMMENTS

That catheter will be left in for ten days. The patient has been catheterizing himself for years. We get a primary union in most of these cases. Very important after prostatectomies and very important after operations on the bladder where the urine escapes to the surface is that the whole field be covered with boric acid, which lessens the tendency to decomposition of the urine.

Postscript.—The patient made an uneventful recovery. On December 21st the catheter could be passed without any trouble: there was not the slightest obstruction.

A lesion somewhat akin to that in the above case is *callous ulcer of the bladder*, the pathology and treatment of which have been described by Leo Buerger (*Medical Record*, April 12, 1913). Among the conclusions this writer draws are the following:

"1. Clinical, cystoscopic, and pathologic studies in two cases of vesical ulceration have conclusively shown that simple callous ulcer of the bladder can and does exist.

"2. The clinical symptoms of this condition are intense dysuria, urgency frequency of micturition with sanguineous and purulent urine. The manifestations become progressively more marked and take a chronic course.

"3. The chronicity of this disease and the progressive impairment of vesical capacity speak strongly for the view that chronic cystitis and contracted bladder are often the sequelæ and outcome of solitary ulceration.

"4. The region of the trigone seems to be the favorite site for the chronic indurated type of ulceration. . . .

"8. Histologic examination in two cases has shown that the pathology of this condition is rather characteristic, there being a superficial deposit of urinary salts, a layer of necrosis and ulceration, and a stratum of newly formed connective tissue with active evidences of inflammation (Fig. 209). The margin of the ulcer shows intensely vascular inflamed mucous membrane and submucosa.

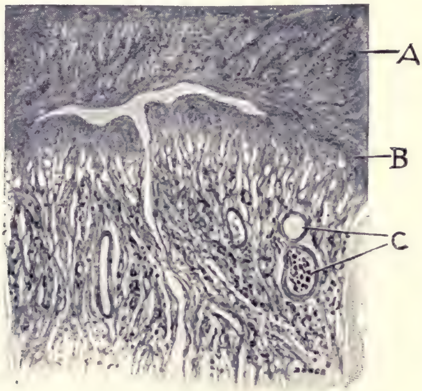

Fig. 209.—Drawing showing microscopic section of callous ulcer: A, Exudate on surface; B, zone of necrosis; C, inflammatory fibrotic tissue (Buerger).

"9. In every case of chronic cystitis, particularly in women, where dysuria, urgency, and frequency of micturition are marked, a careful search should be made for this form of ulcer, for if it be present, it is more than likely that chronic cystitis, irritable and contracted bladder are secondary. . . ."

HYPERTROPHY OF PROSTATE GLAND—SUPRAPUBIC PROSTATECTOMY

Summary: Clinical history of patient; comments—sepsis the result of catheterism; hyposulphite of calcium irrigations of bladder beneficial; never operate in acutely infected state; perineal abandoned for suprapubic operation; vasectomy for orchitis in enlarged prostate; ease and difficulty of removing enlarged prostate; hemorrhage after removal of prostate and how to combat it; operation—suprapubic prostatectomy—running comments on same; postoperative comments—review of method of enucleating prostate; importance of draining prevesical space of Retzius; importance of using anchor stitch in bladder; Dr. Bremerman's siphon apparatus; Freyer on suprapubic prostatectomy.

CLINICAL HISTORY OF PATIENT

A WIDOWER, seventy years of age, was admitted to Mercy Hospital September 14, 1915. The family and venereal histories are negative. When eighteen years of age the patient had typhoid fever.

Three years ago the patient was exposed to cold and wet, following which he had a coryza. He also noticed a burning sensation at the end of the penis after urinations: this continued to occur at intervals throughout that year. Two years ago he noticed that this burning sensation was developing into more of an actual pain, and was becoming more frequent and pronounced, sometimes running up along the penis to the bladder. These pains followed urination, but there did not seem to be any change in urination.

This state of affairs increased in severity until September 4, 1915, when the patient was taken with a severe chill lasting fifteen or twenty minutes, and followed by feverish sensations. Twelve hours after the chill he had sharp and severe pains in the region of the bladder and found he could not urinate, on account of what appeared to be some obstruction high up in the penis. It was possible to urinate a little bit by firm and prolonged pressure for a day or two, until it stopped completely. The pain in the region of the bladder continued to be sharp and severe until he was catheterized, when it disappeared. The least amount of urine in the bladder caused severe pain.

For the past two weeks the patient has used so much internal force to empty the bladder that he has noticed a slight swelling of the testicles. For the past seven years he has had a recurrent left inguinal hernia, which has increased in size in the past two weeks on account of the increased intra-abdominal pressure. He has also noticed that the hemorrhoids which he has had have been bleeding in the past two weeks.

Examination by Dr. Murphy (September 17, 1915).—The prostate gland is only moderately enlarged and it is not very hard: it has no nodules in it. The greatest induration is in the middle. There is no distention of the *bas fond* of the bladder and no evidence or history of stone. He is ordered to have calcium hyposulphite irrigations of the bladder, followed by applications of argyrol.

COMMENTS

Dr. Murphy (September 23, 1915): What was his condition when he entered hospital?

Intern: He could not urinate because of the pain.

When did he enter?

On the fourteenth of September.

This is the twenty-third. Why was he kept here? Because he had chills and fever—a temperature of 102.4° F. every evening. He has had a mild chill every day, meaning that he had an acute sepsis as a sequence of the catheterization. Wherever you keep up catheterization for any considerable length of time you have what? Urethritis, and unless you are exceptionally fortunate you are sooner or later going to get a saprophytic or probably a pus infection of the bladder. This man had a pus infection of his bladder: the urine contained large quantities of pus. The bladder was irrigated and then injected with argyrol and then re-irrigated; then we used a solution of 1:200 of the hyposulphite of calcium to stop rapidly the decomposition of the urine, as that is a powerful germicide. You remember that hyposulphite of calcium is used in very small quantities for the sterilization of water in large quantities: it is one of the most powerful germicides we have. As the result of this treatment the pus diminished to practically nothing. Now he is in suitable condition to have prostatectomy performed. We never operate upon these cases in the acutely infected state: if you should operate, you are bound to pay the price in the way of high mortality. It is not the operation that kills: it is the fact that you are getting into a vascular zone in the presence of a virulent infection, which is bad surgery because you do not see it; it is because it is hidden and out of view that we do these things. If that were out in the open you would not think of going in and tearing up that zone until you had rendered it as aseptic as you possibly could.

Concerning the type of operation, we began originally with the perineal operation, but have gradually drifted and drifted away from that until now we remove nearly all the prostates by the suprapubic route: if, however, we have a superlatively small prostate in a thin man, we perform the perineal operation.

There is a complication in this case which we must take into consideration: this man has had a couple of mild attacks of orchitis, but no severe attacks. Where we encounter that inclination to an infection in the testicle we always perform vasectomy, thereby diminishing the chances of having the infection extend down into the testicle and having the additional operation of orchidectomy to perform—an operation which is always a serious addition to prostatectomy.

By the suprapubic route, the job of removing the prostate is at times extremely easy, at times extremely hard. When the gland is small, fibrous, and firmly adherent, it is difficult to get out; when it is large, soft, and juicy, the rule is that, after striking the capsule, you can have it out within a few minutes. I recall one of my very early operations by the suprapubic route, in which I was making a demonstration to the visiting doctors: I swung my finger around a couple of times and out popped the prostate, and a doctor in the front row said, "Doctor, do they always pop out like that?" You sometimes sweat and sometimes sweat blood getting them out. In the matter of drainage, we make an effort to remove the drain early—as soon as the bleeding stops. Sometimes the bleeding is considerable, and sometimes it is little or nothing. This aged man with his severe arterial changes will not tolerate much blood loss: if he has much blood loss, you must compensate for it, and you must compensate for it quickly, and the way to compensate for that blood loss in an aged man is by putting a needle into one of his dilated veins which you can pick up anywhere in the skin and give your intravenous. Do it early. Do not wait until he is washed out and gone. If he is bleeding much, you may add ten minims of 1 : 1000 adrenalin to the intravenous.

OPERATION

[After preliminary vasectomy of distended vas, laparotomy was performed.] . . . We are dividing the skin and fasciæ of the abdomen in the midline, and we are dividing the attachments of the recti transversely and freeing them, so as practically to open up directly into the space of Retzius. . . . Now we are below the peritoneal fornix, and I am pushing the latter upward, unopened. In performing this operation we always anchor the bladder—not that this is necessary, but we do it for safety's sake. We anchor it immediately under the symphysis. This stitch goes through the bladder-wall and picks up the bladder-wall and holds it. In entering the bladder I shall endeavor to keep within these two anchor stitches and not get into the connective tissue on the side of the bladder, thereby running the risk of an infection in there. Now, then, we open the bladder onto the sound—always. . . . There is the sound sticking through! Now I feel the prostate. . . . I am just emptying the bladder, letting the large quantity of urine flow out of the bladder. These are special retractors for the bladder: they are to be kept elevated with the traction upward while I inspect the field and the prostate. . . . There is no evidence of malignancy. There is one very large lobe: the other lobes appear to be small. Now I pass my finger into the rectum to control the situation. . . . This is the left lobe and it is large: practically all the enlargement is in the left lobe. "*Keep within the capsule!*"—that is the motto. You saw it pop out after we had it loosened—it was purely an enucleation. Now I shall take my deep retractor and inspect this field. . . . There is little or no bleeding. The other lobe is a little bit of a lobe, and we shall not interfere with it at all.

Now we shall close that bladder with fine catgut. There is the opening into the bladder. There are my two anchor stitches. I do not include the mucosa in the stitch. There is the muscularis of the bladder: note its great development. He is an aged man and he has had an obstruction for a long time, with resulting compensatory hypertrophy of his bladder muscles. Here is the original anchor stitch which I now take off: I did not need it at any time, but it is such a comfort to have it there, for it prevents losing the bladder, and we must take no chances of injuring the bladder, which could be destroyed in this procedure. We close this opening in the bladder entirely down to the drain: as soon as the bleeding stops this drain will be removed, and the sooner the better. Remember, it is a foreign body, and therefore a source of irritation. [Heads of recti restored and superficial incision closed.]

Recapitulation.—Let the record show that practically all the enlargement was on the left side, and that the left half of the prostate alone was removed; the operation was performed in the regular way.

POSTOPERATIVE COMMENTS

There is a definite way of performing prostatectomy. The older way was to divide the capsule under inspection and pass the finger beneath. We do not do that. We perform the operation not from the written description given by Mr. Freyer, but from an observation of Mr. Freyer's method as he described it to me in his library. If this is the prostate [indicating], there is your sound. Put your finger in along the sound into the neck of the bladder, and then tear the capsule over onto one side, the side toward you—usually the left side—and go under the capsule. When you get to the middle you feel a resistance and you go in under the other side and tear the capsule, so that you can go clear around from the side you started on. If you have the usual double-lobe prostate, you make your circle from one side to the other. Tearing it that way is better than cutting, because it brings you to a definite place: when you encounter the fibrous bands you know you are in the proper position in relation to it. If you get behind that, you are in a vascular zone. You remember many years ago Dr. Pratt called attention to the fact that if you removed the uterus by a certain blunt dissection where the blood-vessels divided into capillaries, you could take the uterus out without putting on a ligature,—which he did hundreds of times,—meaning that there is a non-vascular zone.

We have two drainages here—one is the drainage of the bladder, and the other is the drainage of the prevesical space of Retzius. The bladder tube has only two openings up to the end, otherwise the siphon will not work. In performing prostatectomy I always—just as we did in the very early work in removing stones, etc.—put in the anchor stitch, because then your bladder is in no danger whatever, and you are always at home, as it were. We have not had orchitis following prostatectomy nearly so frequently with the suprapubic as with the perineal operation.

This man at seventy has a spread in his blood-pressure between the systolic and the diastolic. His systolic was 170 and his diastolic 100—a spread of 70. That is a very wide difference, and indicates a very low expansion. That is your interpretation of what may happen—that he will not stand the loss of blood. If he should show any sign of collapse we shall start the intravenous saline.

Dr. Bremerman has worked out a splendid siphon plan which is very practical for keeping the bladder open.

Dr. Bremerman's Apparatus.—After the patient is placed in bed the tubing is connected with the drainage-tube from the bladder. The Y-shaped tube *F* (Fig. 210) must be below the level of the patient lying in bed; the reservoir *A* filled with water, the stop-cock *B* turned so that the water will drop slowly into the cup *C*, which, on being filled, tilts and empties itself into the funnel *D*. The water running down the long tube *E* into the Y-shaped tube *F* forms behind it a suction which causes a siphonage of the fluid in the bladder. This siphonage may be regulated to occur

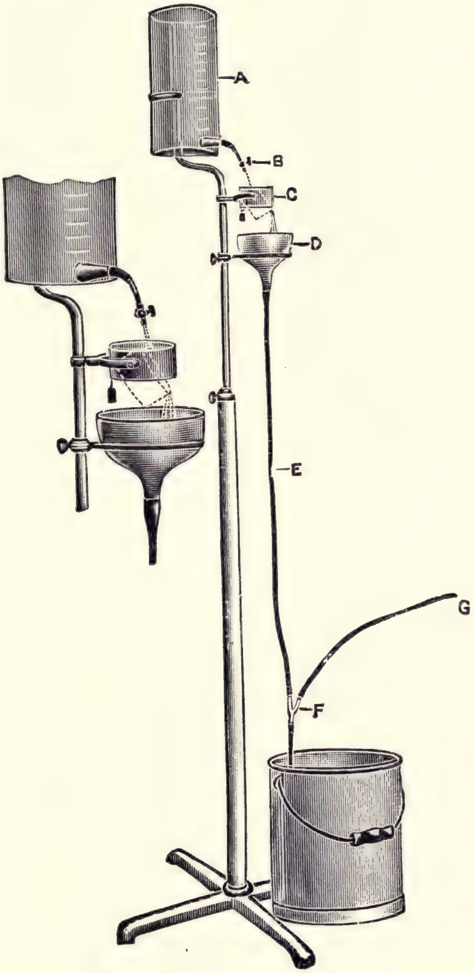

Fig. 210.—Bremerman's apparatus.

at any given interval by arranging the flow of water from the stopcock *B* which flows into the cup.

Dr. Bremerman: I am sure that those who are doing much bladder work have met with the same difficulties in perfect drainage as I have met with in my work, and that if they will take the occasion to use the apparatus which I have devised they will be satisfied with the results.

By perfect drainage you render your patient comfortable, the bladder does not become distended, clots cannot form, the dressings are dry, the bladder cannot fill up, the urine cannot wet the dressings, thus irritating the wound and preventing healing, and cannot trickle into the tissue of the prevesical space and engender sepsis. I have used this apparatus in a large number of cases, and feel, without a doubt, that my satisfactory results have been due almost entirely to perfect drainage.

I might call attention to another important feature of the drainage apparatus herewith described: with its use one can readily tell how much urine the kidneys are excreting. This is accomplished by measuring the fluid in the reservoir, also the urine, blood, and water in the receptacle under the bed, subtracting this former amount from the latter, the difference being the urine and the blood. This knowledge is very essential, as it is an aid to know the functional capacity of the kidneys.

I might suggest a precautionary step to be taken in regard to placing the drainage-tube in the bladder. Care must be taken that the end of the tube does not come into contact with the floor of the bladder. The opening in the bladder must be sutured to fit the tube closely.

Postscript.—The suprapubic drain was removed October 1st —eight days after operation. The patient was dressed October 19th: there was a perfectly free urethra and the catheter passed without the slightest obstruction. The stitches were removed. He made an uneventful recovery.

Extract from a paper by Mr. Freyer entitled "One Thousand Cases of Total Enucleation of the Prostate for Radical Cure of Enlargement of That Organ" (*British Medical Journal*, October 5, 1912).

Eleven years have just elapsed since, in a lecture published in the *British Medical Journal* of July 20, 1901, I first placed before the profession at large full details of my operation of total enucleation of the prostate for radical cure of enlargement of that organ. . . .

Having now completed 1000 cases of the operation, I have considered that it would be interesting to you to have a summary of the results presented to you, with some thoughts and reflections derived from this large experience of the operation.

The patients varied in age from forty-nine to ninety years, the average being sixty-nine. There were among them 62 octogenarians between eighty and ninety years, and 11 bordering on this age, seventy-nine years.

The prostates removed weighed from ½ ounce to 17 ounces, the average weight being 2¾ ounces.

These 1000 cases, though, of course, mainly drawn from the British Isles, embrace almost every race and nationality on the face of the earth. . . . The great majority of the patients had been entirely dependent on the catheter for periods varying up to twenty-four years. Nearly all came in broken health, and many were apparently moribund when the operation was undertaken. The vast majority of them were, indeed, reduced to such a miserable and painful condition that existence was simply unendurable; these latter were prepared to run any risk from operation provided I could assure them that in case of survival they could dispense with the catheter. Few of them were free from one or more grave complications, such as cystitis, vesical calculus, pyelitis, kidney disease, diabetes, heart disease, thoracic aneurysm, chronic bronchitis, paralysis, single, double, and even treble hernia, hemorrhoids, and in a few instances cancer of some other organ than the prostate. Such were the unpromising conditions under which, in a large proportion of cases, the operation was undertaken.

In connection with these operations there were 55 deaths, or 5½ per cent., the remaining 945 operations, with the exception of one to which I will presently allude, being successful. With experience the mortality has been gradually diminishing from 10 per cent. in the first 100 cases to 4½ per cent. in the last 400; in my latest 100 cases there have been only 3 deaths.

The causes of death were: Uremia due to chronic kidney disease, 24; heart disease, 8; shock, 7; exhaustion, 3; septicemia, 2; mania (hereditary in 1), 2; malignant disease of the liver, 2; bronchitis, 2; pneumonia, 1; heat-stroke, 1; pulmonary embolism, 1; cerebral hemorrhage with paralysis, 1; and acute pancreatitis, 1. . . .

Nearly one-half the deaths connected with this operation were directly attributable to kidney disease resulting in uremia, and in a large proportion of the deaths set down to other causes the kidneys were also affected. Kidney disease incident to prostatic enlargement is, of course, due mainly to two factors—backward pressure, caused by the obstruction to the natural flow of urine, and ascending infection of these organs from the cystitis, *which invariably results sooner or later from the habitual use of the catheter*. (Italics ours.) I cannot, therefore, too strongly urge the enucleation of the prostate, when there is decided enlargement of that organ, accompanied by urgent symptoms necessitating the employment of the catheter, before grave complications set in. When undertaken whilst the patient's general health is sound and the kidneys unaffected, there is practically no danger attaching to the operation in experienced hands; but when complications set in, and particularly when the kidneys become diseased, the operation must necessarily be attended by a considerable risk.

In 181 instances the prostatic disease was complicated by the presence of stone in the bladder, mostly of the phosphatic variety due to cystitis. The operation in these cases partook, of course, of a dual character—prostatectomy *plus* suprapubic lithotomy. Amongst these there were 16 deaths (all have been accepted as resulting from the prostatectomy part of the operation), or 8.84 per cent. Amongst the remaining 819 cases uncomplicated with stone there were 39 deaths, or 4.76 per cent., so that the mortality among the former was nearly double that from the latter, a fact which emphasizes still further the advisability of having recourse to prostatectomy at an early period before the formation of stone as a sequela to this disease sets in.

Another grave danger attached to postponement of operation is this—that recent experience has demonstrated beyond doubt that the adenomatously enlarged prostate, which is, of course, benign, has a tendency in a considerable proportion of cases to assume cancerous degeneration under the irritating influence of the catheter and the complications incidental to its habitual employment.

When I speak of "success" after this operation, what do I mean to convey to you by this term? I mean that in all cases of adenomatous enlargement of the prostate when my operation is properly performed, and the after-treatment carried out in the manner described in my published writings, an absolute and permanent cure results, the patient regaining the power of retaining his urine at will and passing it naturally, without the aid of a catheter, as well as he ever did. There is no relapse of the symptoms; on the contrary, lapse of time seems only to consolidate the cure. There is no contraction at the seat of operation leading to organic stricture; there has been no instance of a permanent fistula resulting, and there is no loss of sexual power. . . . . There are, indeed, no half-measures about this operation. The patient can be assured beforehand that if he is prepared to accept the slight risk attached thereto he can, with moral certainty, look forward to a complete cure. In one case alone have I known the patient fail to regain the power of voluntary micturition, and in this instance the bladder was quite flaccid, and seems to have been completely paralyzed by the extreme overdistention before the catheter was employed.

I attribute the utmost importance to the rapidity with which the operation is accomplished. The essential portion of the operation, that during which profound anesthesia is necessary, is covered by the time that elapses between commencing the suprapubic cystotomy and the delivery of the prostate from the bladder. With increased experience has come rapidity of execution. In the early days of the operation it was usual for this period to extend to twenty minutes or half an hour, or even more, while latterly in ordinary cases this period is covered by from two to four minutes, and in difficult cases by from eight to ten minutes. Rapidity in operating is of vital importance in an operation of this kind, confined as it is to persons of advanced age, thus shortening the period during which profound anesthesia is necessary, minimizing the loss of blood and obviating shock. . . .

Even the purpose of the normal prostate in the human economy, always a subject of speculation, has been rendered more speculative still by the results of this operation. It is widely held that the prostate is some kind of accessory sexual organ. But there is no diminution of the sexual capacity after enucleation of the enlarged organ suprapubically by my method, the nerves controlling this function being left intact, though when removed perineally sexual desire would appear to be destroyed.

A very satisfactory feature in connection with this operation is that the patients, as a rule, state, after the lapse of months or even years, that they feel from ten to twenty years younger than before the operation. I have been so much impressed by this remarkable rejuvenescence that, apart from the physical pain and mental depression caused by the obstructive symptoms, it has suggested itself to my mind that the enlarged gland may pour into the system some internal secretion of a toxic or deleterious character.

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There are two questions that commonly arise in connection with the operation of prostatectomy. Both have been answered by Hugh Cabot, the first in *Surg., Gynec. and Obst.*, August, 1913, 213–17, and the second in *The Lancet-Clinic*, March 8, 1913.

I. *What portions of the prostate are removed by the method of enucleation, whether from above or from below?*

"It will, I think, be generally admitted that the removal of the whole prostate must involve the removal of the posterior lobe. If the posterior lobe is removed, clearly with it must be removed those portions of the ejaculatory ducts which lie between the verumontanum and the capsule. These structures are strikingly absent not only in the specimens described by Mr. Thompson Walker, but in all the specimens to which I have had access, a not inconsiderable number. The specimens herewith presented show in section that these ducts lie wholly behind the adenomatous masses of the lateral lobes and the median lobe. As the posterior lobe is never involved in the process, the line of cleavage necessarily passes in front of it, and it is from this, the posterior lobe, that the process described by Mr. Freyer as the 'shaking free' of the masses takes place. . . . What actually occurs in these operations of enucleation is that the adenomatous masses in the lateral and median lobes are shelled out from the capsule of the prostate on the side, from the muscular structure of the bladder neck above, and from the *posterior lobe, the old so-called surgical capsule, below*."

II. *What are the relative merits of the suprapubic and perineal operations in their present state of development?*

"The suprapubic route is the anatomically correct approach. It attacks the hypertrophied portion at the point where it can be reached with less destruction of tissue and with the greatest certainty of complete removal of the obstructing portion. It does less damage to other structures, interferes less with other functions, and is followed by fewer complications. It is more certain to result in cure.

"The perineal operation shows at the present time a definitely lower mortality. It is a more difficult surgical procedure, no matter what technic be selected. It is more likely to do damage to other structures and functions and is less certain to result in cure. Of the various types of perineal operation, that of Proust, combining the prerectal incision with the intra-urethral enucleation, is best adapted for the uses of the average surgeon. I am prepared to assent to the views of Carlier, as quoted by Proust, that the perineal operation survives only on account of certain contraindications of the suprapubic method."

A study of cancer of the prostate, based upon 93 cases found in 878 prostatectomies performed in the Mayo clinic, was made by E. S. Judd and published in *Surg., Gynec. and Obst.*, March, 1915, 274–77.

TUBERCULOSIS OF EPIDIDYMIS (BILATERAL) —EXCISION OF EPIDIDYMES

Summary: Clinical history of patient; comments—pathogenesis of tuberculosis of epididymis; symptomatology; relation of trauma to tuberculosis and to sarcoma of testicle; differential diagnosis between tuberculosis and sarcoma of testicle; importance of early removal of tuberculous focus in epididymis; first operation—excision of left epididymis—running comments on same; post-operative course; second operation—excision of right epididymis—running comments on same; importance of early incision of tunica albuginea in acute metastatic infections of testis proper; tuberculous seminal vesicles heal spontaneously after excision of tuberculous epididymis.

CLINICAL HISTORY OF PATIENT

A STUDENT, twenty years of age, was admitted to Mercy Hospital May 25, 1915. The family history is negative. The patient had congestion of the lungs at the age of two years. He had measles at five. When ten years of age he was operated upon at this hospital for appendiceal abscess; the appendix was removed three months later. When sixteen years of age he had mumps. On January 15, 1915, the frontal sinus was drained.

On February 25, 1915, while wrestling for a paddle in an indoor game, the patient rubbed the end of the paddle against the scrotum: four days later—on March 1st—he noticed a small, hard mass the size of a hickory-nut beneath the left testicle, and separate from the testicle. There was no pain other than a soreness high up in the scrotum, which was the first indication of the present illness. This mass grew larger and later seemed to unite with the testicle: it was somewhat tender on pressure, but there was no distressing pain; it did not disappear by any manipulation or change of position.

About three weeks later a second mass appeared above the left testicle and to the outer side: this came on suddenly and rapidly increased in size, at first separate from the testicle and independent of the first formation.

The two masses—now the size of a testicle—seem to unite and are growing larger, surrounding the left testicle. The right testicle is not involved. Hot applications decreased the size of these masses, which now appear as one with a ridge in the line of their union. The left testicle can be felt to the inner side of the mass, but moves with it. There has been no severe pain in this new formation, which feels very hard. There is no history of venereal infection.

Shortly after admission to hospital on May 25, 1915, at 9 P. M., a tuberculin test was given, using five minims of dilution II. On May 26th at 5 P. M. his temperature was 100° F.

Examination of the urine on May 26th was negative. An examination on the twenty-seventh showed 20 to 30 white cells to the field. On the twenty-ninth many white cells were found.

A blood-count made on the twenty-sixth showed 5,184,000 erythrocytes and 12,400 leukocytes. The blood-pressure was 90.

COMMENTS

DR. MURPHY (May 29, 1915): He has no urethral discharge, no increased frequency of urination, no special desire to empty his bladder when he needs to empty it. As far as the testicle is concerned, tuberculosis begins in the epididymis, and not in the testis proper: to this I have seen but one exception, and that exception we had within the last two months. If it begins in the epididymis, what does it do? It produces a discharge and pus escapes. That pus is carried along the thickened vas into the seminal vesicles, irritates the seminal vesicles, and produces an irritation of the neck of the bladder, with increased frequency of urination, which is usually the first symptom of tuberculosis of the urogenital tract.

One of the first symptoms of tuberculosis of the kidney and tuberculosis of the epididymis is increased frequency of urination. The second is the increased speed with which the patient must empty the bladder when the inclination comes: he must go quickly, and sometimes he loses a few drops of urine before he can get to the toilet. The third symptom is hemorrhage, and the fourth is the presence of pus in the urine. There is always an increased number of leukocytes from the beginning.

Tuberculosis of the testicle and sarcoma of the testicle are commonly sequences of what? Sequences of trauma, just like tuberculosis in other positions in the body. He had a trauma to his testicle, and the trauma was of only moderate severity. That is peculiar to the type of traumata associated with tuberculosis and sarcoma. You never have tuberculosis in a bone where the injury is severe enough to fracture the bone. You never have sarcoma in a bone where the injury is severe enough to fracture it. Where it is associated with trauma at all, you always have it coming from a trauma of mild severity—like a boy running against a chair. It does not incapacitate him. The first thing he notices is that the tibia is getting a little larger. If it is a sarcoma of the slow-growing type, or if it is a sarcoma of the rapidly growing type, within one week or two weeks you commence to have the pain and swelling of the tibia. If it is tuberculosis, you never have the symptoms before three weeks from the time of the trauma. This boy states that he was well after the trauma, that he had no irritation, and that he finally commenced to notice a swelling of the testicle.

In this case we could not make the differential diagnosis on the clinical history between sarcoma and tuberculosis. Then we endeavored to make the differential diagnosis by giving him five minims of dilution II of tuberculin, and the reaction was negative. Still, when you come to examine his vas deferens, it is thickened as it should be only with a tuberculosis, and as it should not be with a sarcoma. A sarcoma is never a mucous-membrane surface disease. A sarcoma of the testicle is preëminently a lesion of the hilus of the testis or a lesion of the testis proper, and practically never a lesion of the epididymis. From the boy's description the lesion began as a disease of the epididymis on the *side* of the testis, and not in the testis proper. Taking all factors into consideration, I have come to the conclusion that it is tuberculosis, notwithstanding the absence of a positive tuberculin reaction, and notwithstanding the absence of irritation in the bladder, and notwithstanding the absence of frequent urination, and notwithstanding the absence of bacilli in the urine in the repeated examinations which were made. If that is the case, then there is one operation alone that is indicated: the removal of the epididymis from the testis and the removal of the vas deferens as high up as one is able to reach it. Remember, tuberculosis begins in the epididymis preëminently, beginning most commonly in the globus minor, then in the body, and then in the globus major. Then you can see how rarely it begins in the hilus of the testicle and how less frequently it begins in the testis proper. The size of these spots on the chart (Vol. III, February, 1914, Figs. 42, 43, p. 67) gives you an idea of the frequency with which it occurs in the different portions of the testicle. If it is a primary disease of the epididymis, once it commences it always destroys the continuity of the tube, and the indication is to remove the nodule in the epididymis in the early stage the moment you recognize it. Do not wait until it is ripe, as in a recent case we had in which it was large enough to fit in my two hands held in that relationship [indicating]. What are you waiting for? For it to get ripe, in place of taking it out when it is early and most favorable for the patient.

On examination in this case it appeared as though the globus major and globus minor completely encircled the testis proper. There is no effusion in the tunica vaginalis—that is rather rare for a tuberculosis of this severity.

OPERATION

[Incision through scrotum.] . . . There is the tunica vaginalis, and there are the adhesions that have formed around it. There is the thickened vas deferens, and here is an agglutination that is fixing it. Now let me show you how free that testis is from disease, unless there is a mixed infection within. See the globus major! See how the disease comes around encircling the testis. Remember, the spermatic artery and vein are on the inner side and above and go to the testis proper, sending branches to the epididymis, which is on the outer side and below. There is normal tissue. Here is the line of agglutination between the infected zone and the epididymis. Now I shall try to enucleate it. There is a mixed infection. Now you know it is not a sarcoma: you know it is a tuberculosis. Notwithstanding all the negative laboratory tests, the clinical facts come up as evidence supporting the findings, and we believe that the clinical facts predominate over the laboratory findings in arriving at a diagnosis.

Now we are coming down onto the vasa efferentia, which lead from the testis out to the epididymis. This is a clean-cut tuberculosis, and corresponds with the clinical findings, which were not supported by the laboratory tests. The most important clinical fact was that the epididymis was thickened, and the epididymis should not be thickened with a sarcoma. There is the testis proper again. There is the globus major. Now we are coming to the lower pole—to the globus minor. . . . He had a leukocyte count of 12,000: with a mixed tuberculous infection you not infrequently have leukopenia in place of leukocytosis. . . . See! I have taken that epididymis out. There is the testis with its vessels entirely independent of the vas deferens, and, aside from its connections through the minute vasa efferentia, having nothing to do with the epididymis, except that they are close neighbors. There is no occasion whatever for taking out that testis.

Now I am ligating the vas. Look at it! See the size of it! See the infiltration of it! The artery is pulsating nicely. Now, look! there is a lot of *brie*. You can see there is the epididymis where it comes down to and becomes a part of that mass. I want to take that out. I want to secure this vas deferens so I can come back and handle it in the proper way. I take no chances on that, so I put two hemostats on it. Now I am cauterizing this with 5 per cent. phenol. . . . You see that ligature is tied into the crease made by the angiotribe.

Now he has no vesical irritation at all. We never take out the seminal vesicle for tuberculosis of the epididymis: it is unnecessary, because a tuberculosis can get well without taking out the seminal vesicles—even when they are enlarged. Now comes the management of the most important part of the whole procedure, and that is the vas deferens. Now, you see, there is the lumen of the vas deferens. I am putting in this probe with the 95 per cent. phenol on it: that cauterizes the place where I am going to put my ligature. . . . Now I am tying it at the place where I am going to compress it: I crush the mucosa out of the bite of this ligature. That gives me two connective-tissue surfaces in contact and cauterized with 95 per cent. phenol. That is the most important thing in the management of all this class of cases. Now we can take off these two side forceps and let that stump recede. . . . There are the vasa efferentia. We trim off the lower end where the globus major was firmly adherent. There is the dangerous place, as far as something remaining behind is concerned. I am top-sewing the position of the vasa efferentia. . . . There is the tunica albuginea, you see, which I am pushing forward. Remember, the internal secretions of this testis will go on just the same as though it had not been operated upon.

Recapitulation.—Let the record show that there was a mixed infection with a suppuration in both the globus major and the globus minor; that they were completely excised without traumatizing the testis proper; that the vas deferens was followed high up and cauterized with 95 per cent. phenol for ¾ inch upward, clamped and ligated with a fine catgut ligature, and permitted to recede.

If he gets the infection in the other testicle,—which is one of the things to be expected,—he will come to have the epididymis removed in the initial stage: he will not wait until it has developed an abscess of this size. He will be given tuberculin after the operation. You see how easily we swung the epididymis off, and what complete mastery we had of the situation. We preserved the entire testis intact. We are now picking up the dartos tissue: remember, the dartos tissue histologically is made up of a continuation in attenuated form of all the layers that go to make up the abdominal wall.

Let the record show that there is no evidence of an involvement of the other testicle at the present time.

The condition of the other testicle will be carefully watched.

I think that this case is the most complete knock-out to laboratory tests that I have had in a long time, which shows you that the clinical story is the thing of real value.

Pathologic Report.—Examination of the tissue showed it to be tuberculous epididymitis.

POSTOPERATIVE COURSE

Examination of the urine on May 30th—the day after operation—showed 40 to 50 white cells per 1/6 objective microscopic field. On the thirty-first there were a trace of albumin and 15 to 20 cells per field.

The patient made an uneventful recovery and left hospital June 16, 1915. He remained well until November 24, 1915, when he noticed soreness on the side of the external inguinal ring on the right side: this lasted for three days, and then the globus minor of the epididymis became sore. At this time he noticed a small tumor in the epididymis about the size of a split-pea, circumscribed, and moderately painful on pressure. It grew steadily, and at present is the size of a small hazelnut. He received no trauma preceding the onset of the soreness. He had no sore throat or infection elsewhere at the time he noticed the mass. He has no pain on urination and no frequent desire to urinate. He has no pain with bowel movements. He has no pain in the region of the kidney, and no blood, pus, or mucus in the urine.

SECOND ADMISSION

The patient was readmitted to Mercy Hospital December 8, 1915. Examination of the urine on December 9th showed a trace of albumin; an occasional red cell; the microscopic field packed with white cells.

Comments.—DR. MURPHY (December 9, 1915): That is a fairly typic history. We are going to remove the epididymis on the right side, just the same as we removed the one on the left side last spring. There is no more occasion for taking out the testis proper in the early stage of tuberculosis of the epididymis than there would be for taking off the caput coli if you had a case of appendicitis. The testis can be saved in these cases if you operate in time. Tuberculosis of the testicle begins in the epididymis in practically all the cases. When it is associated with a mixed infection,—particularly in children with scarlet fever,—you can have a metastatic infection taking place to the testis in the tunica albuginea, and you can have the tunica albuginea developing into a clean-cut pus-cyst, destroying the entire testis within forty-eight hours. Why? For the same reason that you have the bone destroyed in acute osteomyelitis: the infective material is held in an inelastic capsule that cannot stretch and at once necrotizes. If you get the case early and open the tunica albuginea and let the pus out, you can save the testis; but if you wait until forty-eight or seventy-two hours have elapsed, then you are an expensive ornament about the case, because the testis has already been destroyed. It can be opened in the early stage just as well as in the later stage. We are going to remove his epididymis and save his kidney, save his bladder, and save his seminal vesicles from the ravages of secondary tuberculous infection from the focus in the epididymis. I should say that I have never removed a seminal vesicle. I should say, furthermore, that I have never seen a case with a clinical story of the seminal vesicle being involved in the tuberculous process that, after we had taken out the epididymis, did not entirely heal without operation, but you must take out the primary focus.

SECOND OPERATION

[Incision through scrotum.] . . . In this case there was no fluid in the tunica vaginalis that we could detect. The fluid in the tunica vaginalis of the testis is identical with the fluid in the pleura in tuberculosis of the lung. Now we shall turn this over and to the outer side. . . . There is your tuberculous epididymitis. . . . There are the vasa efferentia extending up. . . . There is a second nodule: it began primarily below. . . . Here is a large one in the globus minor. We shall now divide the vasa efferentia, which pass from the testis into the epididymis. . . . Now I am down to the place where I must endeavor to remove the epididymis. There is the globus major. There is the tunica vaginalis coming way up here where you find your vas deferens and blood-vessels. There is the lumen of the vas deferens: we shall merely excise it. . . . Now we wish to take out the vas deferens from here down. . . . Now then, we come to an encapsulated suppurating focus, which is here. We shall turn this around so as to separate that suppurating focus from the testis proper. . . . We find here the line of demarcation between it and the testis: it looks to me as though this abscess had started to rupture into the tunica albuginea. We leave all the vessels supplying the testis intact. There is your dartos tissue. I have not opened the tuberculous tract at all. That is one of the satisfactory operations of surgery that means so much to the patient. When one has to remove the entire testis, because of involvement of the tunica albuginea and consequent necrosis of the testis, then one has the option of putting in a celluloid or paraffin testis, either of which makes a very good substitute. See the purulent material coming out of the end of that vas! With pure phenol I am cauterizing it down into the tube below the position where I am going to tie the ligature, so as to prevent any tubercle bacilli that may be passing along that tube from coming into our field. I do not neutralize that phenol with alcohol. Notwithstanding all that precaution, you occasionally have a nodule appearing later at the stump of the vas deferens. [Testis replaced into scrotum: incision into scrotum sutured.] . . . If a hematoma forms, we shall aspirate it.

Recapitulation.—Let the record show that we did not open the tuberculous zone at any part of the tract; that we succeeded in taking out the globus major and minor and the middle of the epididymis, in which there was a secondary tuberculosis; that there are no nodules at all in the testis proper; that we cauterized the vas deferens and tied it in the usual way.

Now we shall look over the specimen: it is a typic case of tuberculosis of the epididymis.

Postscript.—The patient made an uneventful recovery. The stitches were removed on December 17th. He left hospital December 21st.

COXA VARA (UNILATERAL) DUE TO STATUS LYMPHATICUS HYPERTHYMICUS—CONSERVATIVE TREATMENT

Summary: Clinical history of patient; examination—the typic signs of hyperthymusism; treatment.

CLINICAL HISTORY OF PATIENT

A MALE, fourteen years of age, was brought to the office May 4, 1916. The family and past histories are negative. The patient is the second of three living children—all males.

The chief complaint is trouble with the right hip. The patient has been healthy, but was never robust until two years ago, when he began to gain weight. The older brother also showed a tendency to get stout between the ages of twelve and fourteen. Last summer, while in camp, the patient noticed some aching and soreness in the thigh muscles of the right lower extremity: these subsided after a time and he had no further trouble until December, 1915, when he again noticed the soreness in the thigh muscles. He has some pain in the right knee, but none in the hip.

In November, 1915, the patient sprained the right ankle, and the doctor ordered him to use crutches. When he discontinued the use of the crutches he limped, his parents attributing the limp to the sprained ankle.

While at a dancing party during the Christmas holidays the patient had a sudden pain in the right knee and had to be assisted home. Since then he has used crutches all the time.

For the past two months the patient has had no aching or soreness in the thigh muscles. He weighs 130 pounds. He complains of pain in the right shoulder.

Examination by Dr. Murphy (May 4, 1916).—A skiagram of his head reveals not the slightest indication of enlargement of the sella turcica. A skiagram of the right hip reveals very pronounced separation or a pronounced line of demarcation between the epiphysis of the head of the femur and the neck; the epiphyseal margin is decidedly larger than that on the left side, and there is some shortening of the neck, but the latter is not yet in a coxa vara relationship. He walks with the right leg turned out. He has typic signs of hyperthymusism—the general conformation of the abdomen and the enormous folds of fat on it (Fig. 211); the development of the mammary glands; the diminutive genitalia; and the absolute absence of axillary and pubic hair, not-

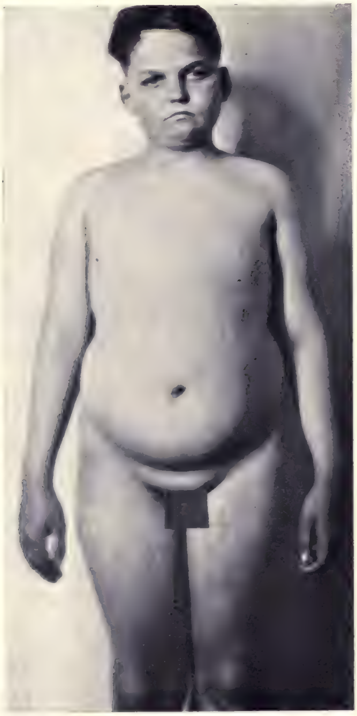

Fig. 211.—The general conformation of abdomen with the enormous folds of fat, the development of the mammary glands, the diminutive genitalia, and the absolute absence of axillary and pubic hair at this patient's age are all signs typic of hyperthymusism.

withstanding he is fourteen years of age. The length of the right lower limb is 33 inches; of the left, 33½.

The mother states that he complains of a cold, and on interrogating her as to what she meant by a cold, she said mucus in the throat with a sense of pressure and a dry, unproductive cough, excepting the little dry mucus. He has no dyspnea. The cough is due to the pressure of the enlarged thymus on the trachea and the bifurcations of the bronchi. He has an increased area of flatness above the base of the heart, and the thickened thymus can be felt above the suprasternal notch. He has a diminution of the thyroid gland so that it can scarcely be recognized. It is a typic case of the earliest stage of coxa vara. No change in the left hip has yet taken place. Examination of the urine shows no albumin, but the presence of sugar by the Haines and Mylander tests.

TREATMENT

The patient is ordered to bed with Buck's extension on the right lower limb, *x*-ray applications with the Coolidge tube over the thymus gland, and the internal administration of from three to five grains of desiccated thyroids three times a day.

The prognosis is favorable with the proper treatment.

(A case of "Coxa Vara (Bilateral) due to Status Lymphaticus Hyperthymicus—Progress under Conservative Measures," was published in Vol. IV, December, 1915, 1191–6.)

CASE I.—HYPERPLASTIC SYNOVITIS OF KNEE-JOINT—PARTIAL CAPSULECTOMY—ABLATION OF SEMILUNAR CARTILAGES

CASE II.—POLYARTHRITIS WITH RICE BODIES IN THE KNEE-JOINT—ARTHROTOMY WITH REMOVAL OF RICE BODIES

Summary: Case I.—Clinical history of patient; comments—interpretation of skiagram; hypertrophy of infrapatellar fatty bursa shoves ligamentum patellæ forward to a right angle with tubercle of tibia; tuberculosis of hypertrophic type shows great tendency to cure; benefit from capsulectomy in hypertrophic synovitis of knee; operation—ablation of semilunar cartilages and hyperplastic portion of fatty capsule; running comments during operation.

Case II.—Clinical history of patient; comments—apparent hopelessness of the case at first; tendency to neglect cases of arthritis; value of salicylic acid in the arthritides and lack of appreciation of this remedy; rôle of teeth in joint infections overestimated; operation—removal of rice bodies from knee-joint; running comments during same.

CLINICAL HISTORY OF PATIENT

A FEMALE, thirty-one years of age, was admitted to Mercy Hospital May 1, 1916. The family history is negative. The patient had measles at the age of seven years; mild typhoid fever at twenty-one; and frequent attacks of tonsillitis up to the age of nineteen or twenty, and then none until January, 1916. The tonsils have not been removed. Her health is usually good. Menstruation began at thirteen and was regular until the birth of her first child, this labor occurring when the patient was twenty-five years of age. She has been married nine years and has two children. She had two miscarriages before the birth of the first child—one at three months and the other at six weeks: no complications followed either miscarriage.

The chief complaints are pain, swelling, and extreme tenderness in the left knee. In the fall of 1904, while sliding along the polished floor of a hall in a dancing academy, her foot caught in a floor mat and she fell forward onto the stone steps. She struck heavily on one knee, but is not sure which knee it was: she thinks she was sliding with the right foot forward. She got up at once and walked several blocks. The knee was very painful and she had to limp slightly. She came back to the house and tried to dance, but the knee was so painful that she could not. She remembers no swelling, redness, or bruises. She had no treatment, but did very little walking for the next two or three days.

The patient had no further trouble until March, 1907, when she noticed a swelling of the left knee, which came on within twenty-four hours with no trauma preceding. The swelling was most marked anteriorly, but there was no pain or redness. She was pregnant at the time, and two or three months later miscarried. She continued to use the limb and had no stiffness or aching after using it. She had no chills or fever. One week after the onset she went to a doctor, who aspirated the knee a few weeks later and obtained a clear fluid. Cultures were made and reported negative.

The condition remained the same until November, 1909. In the mean time the knee was again aspirated. The swelling varied little, if any. There was no redness or disability. She does not remember about the pain, but thinks there must have been some at times, because she thought the trouble was rheumatism.

In November, 1909, the patient consulted a doctor, who said that the trouble was tuberculosis. During the succeeding thirteen weeks she had four aspirations and three injections into the knee: there resulted, however, little or no change in the condition of the knee.

The patient continued to use the limb until the summer of 1911, at which time the left knee was weak and would ache slightly after excessive use. From the summer of 1911 to the summer of 1912 she wore a brace from below the hip to just above the ankle, with but slight action at the knee-joint. She wore the brace day and night until January, 1913, when she wore it during the day alone. When the brace was removed, the knee was quite stiff and very sensitive to jolts, etc.

Up to the present time the condition has remained about the same. The patient says that in cold or damp weather the knee is worse and at times more swollen. After each confinement the knee was worse for several months. At present she has only about one-third flexion at the knee, but full extension. She has lost four or five pounds in weight in the last six months. She has no cough or night-sweats, and her general health is good.

Examination by Dr. Murphy (April 7, 1916).—There is very pronounced—in fact, enormous—thickening of the infrapatellar fatty bursa. It is extremely sensitive to pressure: the bone itself is not so sensitive. The capsule of the joint is thickened. There is an effusion in the joint, and the joint is sensitive. She was given a tuberculin test, which was mildly positive.

On April 24th skiagrams of her teeth were taken. She has pyorrhœa alveolaris, for the treatment of which she was referred to a dentist.

April 27th.—There is roughening of the upper end of the middle zone of the tibia and of the lower end of the femur, the latter being less marked. The lesion is in the upper end of the tibia, just above the tubercle, and involves the infrapatellar bursa very extensively: there is a sharp ridge showing the division of the bursa. The entire infrapatellar bursa and the tissue beneath are probably tuberculous. The skiagrams of the teeth showed no involvement of the roots. Examination of the urine is negative.

COMMENTS

Dr. Murphy (May 2, 1916): The skiagram shows a change in the articular surface of the external condyle of the femur and some change in the external tuberosity of the tibia: there is no change in the internal condyle to speak of. The striking feature in the physical examination of the case is that there is very little fluid in the joint, but there is involvement of the infrapatellar bursa which makes the ligamentum patellæ come out almost at a right angle to the bone.

The clinical story is that of traumatic tuberculous synovitis, but the patient does not respond to the tuberculin test. There are some changes in the joint. She has had injections without accompanying improvement. When you look at the bone, you see no evidence of tuberculosis in the bone in either skiagram. The clinical course has not been the clinical course of a bone tuberculosis.

What I want to call your attention to is the patella. That is not the patella you see there: that is the ligamentum patellæ. You see how it goes up at a right angle to the tubercle of the tibia; that seems to permit the anterior capsule of the joint to get in between the bones all the time, so that when she straightens her leg, it is continually pinched and traumatized. We have had two cases of complete capsulectomy. We did not interpret either of these two cases as being tuberculous: they were of the hypertrophic synovitis type. Fenger used to say that all that condition was tuberculous, but the pathologic findings do not justify that statement, nor does the clinical course justify it, but we know that in patients who have hypertrophic tuberculosis either in the intestine or anywhere else there is where we have the greatest tendency to cure. "Hypertrophic" means enlargement by connective-tissue formation, endeavoring to hold in and encapsulate the tuberculous process—that is what it means when translated into pathologic terms and not into lexicon terms. That is why these cases which have been originally tuberculous go on to splendid cures. One of the cases I referred to was that of a doctor who had been laid up for a great many years and finally was out of commission. We performed complete capsulectomy, and now he flexes his knee almost to a right angle and has not a particle of pain, which is an ideal result. With this woman it is better that she should have a stiff knee than suffer the way she has been suffering for the last twelve years.

OPERATION

We shall probably have to make a double incision. We shall make the primary incision on the inner side of the knee. . . . Wait until I show you this picture. See that protrusion and that hypertrophic condition! See how it stands out there like a tumor! There is the patella: there is where it starts to go at almost a right angle to the bone. There is the fibrous layer of the capsule that you have heard me talk about so much. That lets that recede because it is the thickened anterior infrapatellar bursa. See it force out! See what has happened each time she straightens her leg! There is your mass: there is the synovial membrane on the margin. The articular portion is smooth. Here is the semilunar cartilage—what is left of it. Look at it with its frayed edge! It is frayed out from being constantly ground in the joint. I want to take out this bursa. See! there is the ligamentum patellæ. I want to get any remaining portion of this bursa that may be on the outer side. By elevating the ligamentum patellæ I am able to come clear around it. There is a part, you see, of the tendon. See it ground and ground! See! there is your semilunar cartilage. It does not look like a semilunar cartilage at all: it looks like a piece of connective tissue that has been continually traumatized. Nor does it look like tuberculosis: if it is tuberculosis, it is of the hypertrophic type. Now I am putting some Calot solution into this joint before closing the incision.

Recapitulation.—Let the record show that the specimen revealed a thickened fatty capsule, forcing the cartilage and the inner layer of the capsule in between the articular surfaces of the joint and subjecting them to constant trauma, so that the semilunar cartilage was ground to a shred, with the antero-external margin hardly discernible along the internal margin of the tibia; the external and internal semilunar cartilages were removed; we did not perform complete capsulectomy, but took out the hyperplastic portion of the fatty capsule and a portion of the synovial capsule attached to that; no ligatures were used, and the bleeding had practically ceased when the constrictor was removed.

No amount of intra-articular injection would have influenced that enormously hypertrophied infrapatellar bursa in any manner whatsoever.

Postscript (*May 14, 1916*).—The pulse and temperature are normal. The patient is in splendid condition. The stitches are to be removed in two or three days.

II. CONTRAST CASE

CLINICAL HISTORY OF PATIENT

A MALE, fifty-three years of age, was admitted to Mercy Hospital October 1, 1915. The family history reveals that the patient's father has suffered from rheumatism as long as the patient can remember, and that one sister has had joint trouble for seventeen years. When twenty-one years of age, the patient had gonorrhea, but no complications followed. The patient had carious teeth between the ages of twenty-four and forty, when he had them all extracted.

The chief complaint is multiple arthritis. In May, 1907, the patient noticed a gnawing discomfort in the epigastrium, coming on about 11 A. M. and 4 P. M., and relieved by eating. This pain continued until November, 1909, when the "rheumatism" commenced.

In November, 1909, the patient had a pain in the back of the right hand and in the right wrist. The hand was swollen and very painful, and the pain lasted two months. Then the right shoulder became sore, and for two or three days the pain was excruciating. Then the pain left the right shoulder and went to the left ankle and foot, continuing for one month. Then both ankles and feet became involved. He had chilly sensations from the time the hand first became involved, but does not think he had a fever, except a local one in the joints involved.

During February and March, 1910, the patient was relieved. Then the right ankle and foot became very painful for about six weeks. Then both knees became involved.

In May, 1910, all the joints of the patient's body became painful. He was in bed six months, during which time he had chills and fever: while in bed he lost 49 pounds in weight.

On October 6, 1910, the patient went to Hot Springs, where he remained for six months: while there the condition improved, and the patient gained 28 pounds. Since then he has had more or less pain and some stiffness. Absolute quiet relieves the pain.

Examination by Dr. Murphy (September 27, 1915).—His jaws are not affected. All the joints crackle severely and act as though they contained rice bodies. The capsules of both knees are enormously distended. He has perfect extension and flexion. There is nothing in the hips. The wrists do not trouble him much, and there is but little effusion in them. There is apparently nothing in the shoulders. The left hand was lost from a gunshot wound. There is no tendency to cicatrization or contraction formation. The motion is almost the full latitude. There is great thickening of the capsules in all the joints, but with no tendency to contraction.

Preceding the onset of this joint trouble, the patient had the history of a duodenal ulcer, with the pain coming on at 10 A. M. and at 4 P. M., and distinctly relieved by eating. This leads one to believe that it is a low type of Streptococcus viridans infection—the same type that produces the duodenal ulcer.

There is no evidence of infection of the tonsillar crypts. The patient was subject to boils when young, but has not had them since. He never was jaundiced and never had diarrhea. Examination of the urine is negative.

COMMENTS

DR. MURPHY (May 2, 1916): This patient has been here for a long time. He came in here as a "scrap-heap" man, and we took him in very reluctantly, because it did not look as though there were any hope for him. All his joints were involved. Both knees were bent up almost to a right angle, and it was impossible to bring them down. While he had an appealing face, he made an appealing plea for us to give him a show, and we took him in. Since the time of his admission we have been following up the injections and we have been following up the vaccines, and now we feel very amply rewarded for having taken him in. You know they get on one's nerves. I think there are 8,000,000 of them in the United States, and it does seem as though something should be done before these patients get to the superlative stage of the disease. We do not get any new cases. We do not get any early cases. Even our friends in Chicago do not send in early cases: they just let them get a little worse than the people in the country, because the people in the country read some things which the people in the city do not.

Taking it as a whole, the country doctor averages up in the management of his patients better than the city doctor does, if you take all the country doctors and all the city doctors combined. I think, furthermore, that the country doctor is a better-read doctor: he reads more medical literature and less of the newspapers. If you want anything to get to the medical profession in a big city, put it in the newspaper. You understand, that is only when speaking of a class of disease that seems to be most grossly neglected, like arthritis. The average doctor does not treat acute arthritis a bit better today than he did when I was a student—not a particle. He gives him the salicylates, or some coal-tar preparation that is not half so good. There is nothing that is half so good as the salicylates. I remember when salicylic acid came out: it came out just when I was a student. I remember how the senior professor of internal medicine was wont to turn up his nose at it and criticize it, but acute inflammatory rheumatism in those days was a three months' disease, and salicylic acid cut it down to a two weeks' disease. Now it has gone back to a three months' disease, because we are giving other things in place of the old-fashioned salicylic acid. Nothing is as good as it. Of course, it is not advertised, because it has no proprietary value. All that Osler says about acute rheumatism being nothing is just a dream. Osler has never had acute rheumatism—had he had it he would have a different idea about it. If you get it in the acute stage, you can find out just where the infection is coming from. It is nasal or pharyngeal—in the acute stage more nasal than pharyngeal. The tonsil takes fifth place and the teeth take fourth place in the chronic joint lesions. The profession has gone mad lately about the rôle the teeth play in these infections. There are scores and scores of mouths which are just cleaned right out when they really have no relation to the infection at all, as this patient bears witness: all his teeth were pulled out.

OPERATION

I want to show you the left knee. It was worse than the right. We opened it and took out a large mass of fibrous tissue. Is that not a nice result? It was not a phlegmon: it was a fibrous mass. We are going to do the same with this knee. He calls the left one his "Murphy knee," and he wants the same kind of a knee on the right side. His other joints are in splendid shape. You cannot treat all these arthritides on the same plan, because they are all different pathologic processes, any more than you can treat a paronychia as a sarcoma of the hand. You have to classify them in your mind. From the left knee-joint we took out just one great big mass of fibropurulent tissue.

[Skin incision and reflection of flaps.] . . . There is the fibrous capsule of which I was speaking in connection with the other case. There is the aponeurotic expansion of the vastus internus muscle. Now look at all that tissue which is beneath that capsule to become infected. . . . There is the synovial capsule showing up in the field. There are rice bodies in here: you see you could not aspirate that joint, for the viscid fluid and the rice bodies would not have come out. You can see why this joint could not be aspirated and why it could not be drained. There is no evidence of tuberculosis at all. That is a metastatic infection.

Let the record show that there was a large mass of soft rice bodies; that the synovial membrane is still intact; and that the end of the bone is covered over with cartilage.

You see how, after this long period of time, this knee contrasts with that elbow case we had this morning ("Postscarlatinal Arthritis of Elbow," Vol. V, August, 1916, 649–50). It is only six weeks since the child had scarlatina, and still his elbow-joint is destroyed. In this patient, on the other hand, it is many years since the trouble began, and still the joint is intact, because this was not a virulent infection. [Closes incision without drainage.]

Recapitulation.—Let the record show that the synovial membrane was perfectly smooth; that a white exudate was seen here and there, but soft flocculi the size and shape of rice bodies were present by the thousands in the cloudy serous fluid; there was no ulceration of the serosa; there was no destruction of the articular cartilage, and there was no villous formation on the surfaces of the synovial membrane, which was perfectly smooth, red, and congested, but not granulated.

Postscript (*May 14, 1916*).—The patient is making a very good recovery. The pulse and temperature are normal. The knee has been aspirated twice since the operation, with negative results. He is getting the vaccines.

VARICOSE VEINS OF LEG—MULTIPLE RESECTION

Summary: Clinical history of patient; comments—disposition of the varicose veins and discussion of operative measures most suitable for this case; history of milk-leg contraindicates operation upon varicose veins; Schede's circumcision of leg now obsolete; operation—multiple ligation and resection.

CLINICAL HISTORY OF PATIENT

A FEMALE, fifty-four years of age, was admitted to Mercy Hospital December 17, 1915. The family and past histories are negative. The patient never had an attack of typhoid fever.

The patient complains of varicose veins of the left lower extremity, which have been present for about twenty years. Just above the tibial malleolus there is a small red spot, which, however, has not yet broken down to form an ulcer. The veins in the right lower extremity show a limited amount of varicose changes. The birth of her child had no influence upon the varicosities, which were already present beforehand.

COMMENTS

DR. MURPHY (December 18, 1915): On the left side this patient has very large varicose veins, which extend from the saphenous opening downward to three inches below the knee, at which point the varicosities spread out into the pattern of a goose's foot (*pes anserinus*). These varicose veins should be divided and resected through a vertical incision at a site about two inches above the knee, and resected through a transverse incision about four inches below the knee and to its inner side. It is not necessary in all cases to perform total excision of the varices, after Madelung's method, although in the more difficult cases, for which this method is appropriate, 80 per cent. of the cases are cured. For the ordinary case we are content with resection of the veins, after Trendelenburg's method, for the cut ends never reunite when once tied.

The patient thinks that the varicose veins resulted from standing up all day in her duties as a saleswoman, for the varicosities were present for fifteen years before she gave birth to a child, and the history shows that she never had typhoid fever nor a milk-leg. In every history of varicose veins the previous existence of milk-leg should be brought out, for in such a case one should never operate upon the varicose veins: in milk-leg there is a thrombus in the internal iliac vein, which shuts off the return circulation from the limb, and if, in addition, the superficial compensatory circulation is blocked by ligation of the veins, there results wet gangrene of the limb. I recall such a case. A physician's son came in with severe varicosities of the legs, thighs, and abdomen as far as the navel. He gave the history of having had typhoid fever, which was followed by very severe bilateral milk-leg (*phlegmasia alba dolens*), the edema from which extended up to the lower portion of the abdominal wall, indicating that the thrombus had extended well up into the vena cava inferior (Figs. 176, 177, pp. 784, 785), but not up to the level of the renal veins, and therefore not high enough to be destructive to the kidneys.

In former days the operation of circumcision of the leg below the knee down to the deep fascia—known as the Schede method—was in vogue for varicose veins, but this procedure is now obsolete, owing to the resulting circular constricting scar and the liability of sequential gangrene of the foot (see Vol. IV, October, 1915, 808).

OPERATION

[On exposure, the varicose portion of the long saphenous vein above the knee was found to be larger than a man's thumb, and materially thickened, showing nature's effort to strengthen the wall, weakened by the dilatation; below the knee, where the pes anserinus existed, the veins were found to be adherent: at both sites the veins were ligated and resected. The constrictor, which was applied to make the veins stand out more prominently and facilitate dissection, was then removed. The wounds were closed without drainage, and compressive dressings of dry gauze were applied.]

FIBROMA OF LEG—ABLATION

Summary: Clinical history of patient; comments—diagnostic dialogue with intern; if not already malignant, the lesion has precancerous potentialities, especially if traumatized—pigmented mole as illustration; operation—ablation of tumor.

CLINICAL HISTORY OF PATIENT

A MALE, thirty-three years of age, by occupation a train-despatcher, was admitted to Mercy Hospital September 20, 1915. The family and past histories are negative.

The chief complaint is a growth on the left leg. Seven years ago the patient noticed for the first time a small pimple on the back of the calf of the left leg. It gradually increased in size until it reached that of a hazelnut. It does not seem to have grown in the past year. He has no pain unless he overexerts himself, and then he occasionally has an ache around the growth. It has always been red in color until one month ago, when he bumped it against the desk, knocking off the scab. It bled a little, and since then has been pale in color. The scab is easily knocked off, as when he touches it accidentally. It is elevated above the surface and seems to have a well-formed base and root. He was advised to have it removed a year ago: since that time the tumor has materially changed in appearance.

COMMENTS

DR. MURPHY (September 21, 1915): What is the matter with him?

INTERN: I do not know what to call it. It is a swelling in the calf of the left leg.

He told us that much. A swelling does not mean any more than a tumor means. What is it? What may it become?

Primarily it was a pimple.

No, it was not.

It appeared to him like a pimple.

No. A pimple is a definite pathologic lesion. What is it?

A minute growth about the size of a pimple.

You are certainly a disciple of Talleyrand. He said that language was not for the purpose of expressing ideas, but for hiding ideas. Was it, or was it not a birthmark?

No, doctor.

It was not an angioma to begin with, was it?

No.

It could not be developed beneath the skin in the derma. If it could not be developed in the derma, is it a development from the epithelial cells that penetrate into the derma, or from the fibrous layer of the derma, which is the mesoblastic layer? Or is it beneath the derma? Is it an involution of the epithelial cells that rest beneath the derma, as one sees in sebaceous cysts, and upon which depends the final result?

I saw this patient one year ago and told him that the thing to do was to have the growth removed. I said of this, as I say of moles, that when they become traumatized they can rapidly become malignant. Take the pigmented moles that occur in the skin: when they lose their benignity they become the most malignant of all types of carcinoma or sarcoma (see Vol. V, August, 1916, 551–63). They practically always terminate in death. Whether or not this tumor before us has started on its malignant rampage we do not know.

OPERATION

You see he has traumatized it. We are likely to have less trouble in taking it out this way. You see I did not traumatize the tumor and I did not put an instrument on it. It looks suspicious beneath the derma. Now the question is, has this upper covering of the lesion undergone malignant degeneration?

We made a transverse incision in order to avoid a subsequent vicious contraction of the resulting scar.

Pathologic Report.—Fibroma durum with no evidence of malignant change.

Postscript.—The patient made an uneventful recovery.

TALIPES EQUINOVARUS FROM BIRTH PALSY —ELONGATION OF TENDO ACHILLIS— TRANSFERENCE OF TENDON OF TIBIALIS ANTICUS MUSCLE

Summary: Clinical history of patient; comments—characters of spastic hemiplegia; operation—elongation of tendo achillis—transference of tibialis anticus; after-treatment.

CLINICAL HISTORY OF PATIENT

A MALE, ten years of age, was admitted to Mercy Hospital October 14, 1915. The family history is negative. The patient is the youngest of six children. He has had light attacks of the usual diseases of childhood.

The chief complaint is trouble with the left arm and left leg. The patient was born in a very difficult labor of thirty-six hours' duration: no forceps were used. He was born at full term, but was a very small baby. On the second day the nurse noticed that he had spasmodic contractures of the left side of the face, left arm, and left leg: these continued for a period of from twenty-four to forty-eight hours. The mother does not recall about his having had fever, but knows that the child was very restless and cried much of the time. About the third day he was unable to urinate, and was catheterized by the physician: when the urine was withdrawn, the spasmodic contractures subsided.

The patient was well up to about nine months of age, when the parents noticed that when creeping he used the right hand alone. Later, when he began to walk, the left leg did not seem to carry the weight as the other leg carried it, and he dragged his left foot to some extent.

Now the patient has talipes equinus, and the shoe shows that a varus condition also is present when weight is put upon the foot. All the extensors of the hand act weakly and the extensors of the wrist do not work at all. The deep flexors work, but the superficial flexors are out of commission.

Examination by Dr. Murphy (*October 11, 1915*).—There is a contraction of the gastrocnemius muscle, so that the patient has a talipes equinovarus when he walks. There should be performed transplantation of one-half the tendon of the tibialis anticus muscle, so as to pull the foot over toward the valgus position, with very much of an elongation of the tendo achillis.

COMMENTS

Dr. Murphy (October 16, 1915): This lesion is spastic hemiplegia, the sequence of a birth hemorrhage. He has a spastic gait. In the upper extremity the spasticity is pronounced, and is of the type for which the Foerster operation is performed (division of posterior roots). He is unable to extend his toe or to abduct his foot. Four or five days after birth these patients often have convulsions from a birth hemorrhage: that is what causes the spasticity. If it were a lower motor neuron involvement, he would not have the spasticity: he would have flaccid paralysis.

OPERATION

[Tenotomy with elongation of tendo achillis according to the technic described in Vol. V, April, 1916, 329.] . . . Now the next step is that of dealing with the tendon of the tibialis anticus muscle: I am cutting the sheath of the tendon so as to expose the tendon itself. . . . There is the tendon of the tibialis anticus! Now you want to deliver as much of the tendon as you can and split it. The inner half is to be transferred, so that in place of being an adductor of the foot it is to be an abductor. . . . Now I have this tendon fastened, so that in place of this foot falling to the inner side it will pull up square. [Skin incision closed.]

Now the foot will be dressed in the overcorrected position and kept there for six weeks. At the end of six weeks the gypsum case will be removed: by that time there will be an organic union of the tendon.

Recapitulation.—Let the record show that we first elongated the tendo achillis; then the tendon of the tibialis anticus was exposed and split, and the inner half was transferred to the outer side of the foot in the usual way (see Vol. V, April, 1916, Fig. 64, p. 343).

Postscript.—The patient was discharged from hospital November 5th with instructions to remove the gypsum case at night in ten days, and then, thirty-one days from the time of the operation, to begin walking.

[A talk on the surgery of tendons and tendon-sheaths was published in Vol. V, April, 1916, 195–217.]

TROPHIC SINUS OF FOOT—RESECTION OF METATARSAL BONE WITH EXCISION OF SINUS

Summary: First Admission.—Clinical history of patient; operation. *Second Admission.*—Clinical history of patient; comments—review of previous operation; frequency of talipes equinovarus and reason for its frequency; operative method of dealing with trophic ulcer of foot; operation—resection of metatarsal bone together with sinus.

CLINICAL HISTORY OF PATIENT

A MALE, twenty-eight years of age, was admitted to Mercy Hospital January 15, 1913. The family and past histories are negative.

The chief complaints are limited motion and inversion of the right foot. On February 22, 1909, the patient slipped and fell, striking the right leg against a circular saw. There resulted a deep transverse cut on the back of the right leg, which bled profusely. The wound was sewed up and a rubber drain was inserted. The day after the accident the right lower limb, from foot to hip, felt numb, and this numbness persisted for about four days. The wound continued to discharge for six weeks, during which time the leg was held in a flexed position with adhesive straps, and the foot was inverted. By continuous massage and passive motion the leg gradually became extended, and some flexion of the foot disappeared, but the inversion remained.

In June, 1910, a cow stepped on the patient's right foot. That night he had a chill, followed by fever. He complained of pain on the outer side of the foot, and noticed it was swollen, red, and very tender. The swelling gradually increased and was more pronounced on the plantar surface of the foot at the fifth metatarsophalangeal articulation. The fever continued for about two weeks. On the ninth day following the injury the swelling burst and discharged. He now walked lame and the discharge continued for several weeks and then stopped. On account of the previous injury he walked on the outer aspect of the foot, and after considerable walking the sore on the foot would reopen and discharge.

In December, 1910, the patient had a chill, followed by a high fever. The next morning the foot was painful, swollen, red, and very tender—especially on the outer side. The swelling continued for one week, and then an incision was made and the fifth metacarpal bone was scraped. The swelling and pain disappeared, but the discharge continued for one month. The wound healed over, but reopened after the patient had walked upon it for a few days. Three months later the bone was scraped the second time: the swelling and pain disappeared, but the discharge continued for one month; the wound healed over and reopened after the patient had walked upon it for a few days. Three months later the bone was scraped for the third time, and this time the little toe was removed.

In September, 1912, a swelling appeared on the heel, ruptured, discharged, and continued to discharge while the patient walked upon it. Then the patient began to use crutches to prevent the reopening of the wound.

At present (January 15, 1913) there is tenderness over the previous incision and numbness on the outer side of the foot.

The patient was operated upon by Dr. Murphy on January 18, 1913. A subcutaneous division of the tendo achillis was made. Then an incision was made over the tibialis anticus tendon, the tendon was split, and one-half of the tendon was brought over to the outer side of the foot and united to the periosteum at the base of the fifth metatarsal bone.

HISTORY UPON READMISSION

The patient was readmitted to Mercy Hospital January 12, 1916.

In January, 1915, the patient noticed that his right foot had become discolored, blue, and swollen just behind the metatarsophalangeal joints. He had no chills, fever, pain, or soreness.

In February, 1915, a water-blister formed on the bottom of the fourth toe of the right foot. It opened and discharged serous material without blood or pus: it remained open for one month and then healed.

In March, 1915, an ulcer appeared over the second interphalangeal joint of the fourth toe on the right foot. It discharged serous fluid for about one week and then closed, leaving a red, sore spot about the size of a split-pea: this healed in about one month.

In April or early in May, 1915, the patient noticed a blister at the site of the first one: it was superficial at first, but gradually extended more deeply. A layer of thick, yellowish green, gummy material would form in the bottom of the sore: this could easily be cleansed, and following the cleansing a watery discharge would come away. It has continued to discharge ever since.

Examination by Dr. Murphy (January 12, 1916).—We elongated the tendo achillis and shortened the tendon of the tibialis anticus, and transplanted part of the tibialis anticus to the outer border of the foot. His foot now pulls up perfectly straight and above a right angle. The little toe was amputated about four years ago. There is now a trophic sinus leading down to the base of the fifth metatarsal bone (Fig. 212, 1). I feel that this will not get well and stay well unless the bone is removed. The bone should be removed from the side of the foot, and not from the sole, where the sinus is. While it will be slow in healing, it will give a better chance for the foot ultimately. The joint in that toe appears to be open. We cannot perform arthroplasty, but that will not be necessary.

COMMENTS

Dr. Murphy (January 15, 1916): When the patient came in here originally he had a contraction of the tendo achillis and inversion of the foot. He had also talipes equinovarus, which represents 77.6 per cent. of all foot deformities. The reason for that is that the shortening that occurs on the part of the tendo achillis tends to deflect the foot inward; then comes the shortening on the part of the tibialis anticus, which deflects it still more, so that in this case the original proposition that we encountered was the shortening and contraction of the tendo achillis and the shortening of the tibialis anticus. As a result of the first accident he had a division of the posterior tibial nerve, so that the nutrition and innervation of the foot were materially disturbed.

You see, the patient had two trophic lesions of his foot, and one still remains. The little toe was amputated. Where you have a trophic ulcer on the under surface of the foot it is not well to take off the toe, but take off the distal end of the metatarsal bone and leave the toe: that gives additional support. In the future most of the weight will be thrown not on the heel nor on the toe, but on the arch, where there is less liability of ulceration and trophic changes.

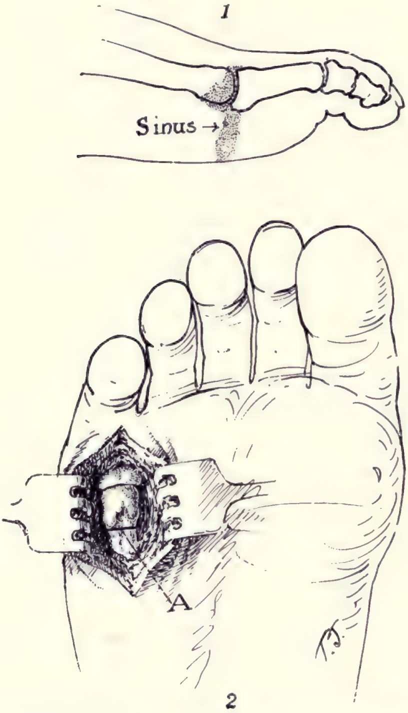

Fig. 212.—1, Shows sinus leading from fifth metatarsophalangeal joint to open on plantar surface. 2, At *A* is seen line of resection of metatarsal head.

My operative plan today is to take out the head of the metatarsal bone and then give him an arch that will carry his weight. These trophic ulcers are mighty difficult to handle, and they are mighty difficult to prevent when your artery and nerve both have been divided.

OPERATION

The diseased soft tissue here is fully ½ inch thick. That sinus goes right through into the joint (Fig. 212, 1). There is the end of the bone that is doing the mischief. You see, it is a suppurating articulation: the whole sac is suppurating, and healing will not take place until you remove the bone. There is just one operation to perform in this class of cases, and that is to go in and remove the entire area. What I want to do is take out all this sinus. You see, there is the sinus clear down to the bone: if that is not removed, it will be very slow in healing. [Resects head of fifth metatarsal (Fig. 212, 2).] . . . There is a tendon which I am pushing out of my field: I shall let the tendon remain, but take out the bone and the sinus. That will be kept in an elevated position until it is perfectly healed.

Postscript.—The patient was discharged February 9th, with instructions to keep off his feet until the wound was entirely healed.

The pathology of that baffling condition, *soft corn,* or clavus, and the successful treatment based upon this pathology, have been admirably worked out by Henry M. Chase (*Bost. Med. and Surg. Jour.*, July 27, 1916, 134). A glance at the accompanying cut (Fig. 213) shows at once that we are dealing in reality with nothing more, in fact, than a curious form of sinus of the foot, the orifice of which opens in the web of the fourth interdigital space. In his conclusions Chase states: "Clavus, or soft corn, presents, on the surface, an area of thickened epidermis, moistened and at times macerated by discharge of lymph through an opening in the thickened area. This opening leads through a direct or indirect tortuous channel into the subcutaneous areolar tissue.

"This lymph-channel may or may not connect with a tendon-sheath. It varies in length, according to its tortuous direction, from one to one and one-fourth inches in depth.

"In none of the cases has it been possible to probe the sinus

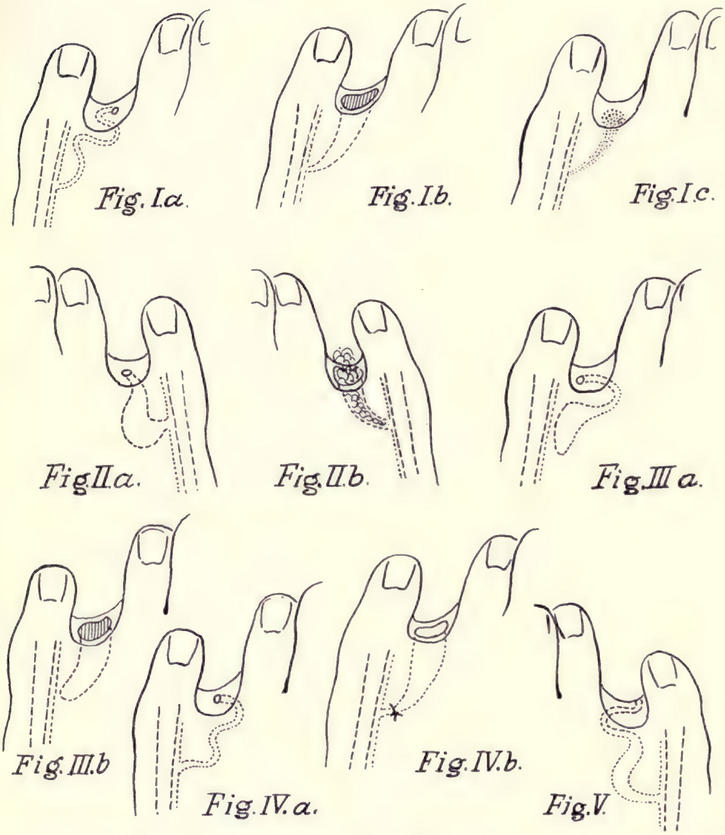

Fig. 213.—The pathology of soft corn. Note in each instance a sinus whose orifice opens into the center of the soft corn in the web of the fourth interdigita space. From here the sinus pursues a more or less tortuous course proximally, to end blindly or become continuous with the sheath of the flexor tendon of the fifth toe (modified from Chase).

until the thickened epidermal layer has been removed, as shown by the sharp change in direction of the channel.

"**Treatment.**—Dissection and excision of the lymph-sac.

If wall tears and is too thin to excise, wipe with carbolic acid and insert small wick for forty-eight hours.

"Transverse adhesive strapping the entire length of the metatarsals. Keep the toes still. Change gauze dressing as necessary; lymph secretion may be slight or excessive for several days.

"Healing by granulation and permanent cure."

In his article Chase reports five cases in detail.

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EDITOR'S PREFACE

Mindful of a deep sense of responsibility to the readers of the Clinics, to the profession at large, and especially to posterity, the Editor has sought to present in this last number not only Dr. Murphy's last teachings, but an account of his last illness and words *In Memoriam* by his most intimate colleagues. It is seldom that the achievements of the really great receive due recognition during their lifetime: this was not true of Dr. Murphy, although the perspective of time will make his achievements loom even greater upon the surgical horizon. Rarer is it that we, who live in the present, stop to consider that those who live after us will deify the luminaries of our time, just as we almost deify such as have lived before us—Pasteur, Lister, and others. It is with the feeling that these Clinics, and especially this last number, will be of historic value, that the latter has been planned.

It is of interest to note that this publication has followed somewhat along the lines of that of one of Dr. Murphy's old teachers, Dr. Th. Billroth, at one time Professor of Surgery in Vienna.* As is generally known, the contents of each number were based upon stenographic notes taken in Dr. Murphy's amphitheater during his morning Clinics. These notes were then typewritten and prepared for the printed page, and where thought advisable, were elaborated upon by extracts from current literature. It must not be forgotten that Dr. Murphy's audience changed daily, so that his teachings, though repeated daily, were always new and fresh to his ever-changing hearers: this may serve to explain the occurrence of a certain amount of repetition in the published Clinics, although latterly this has been kept at a minimum, material from other sources having been put in its place. It was marvelous, the manner in which Dr. Murphy made additions to the edited manuscript for the press. The entire manuscript was read to him; and when Dr. Murphy interrupted the reader, it was to dictate in the most rapid fashion, and without any hesitation whatsoever, a line of thought which had been suggested to him by a certain passage in the text: often one word alone would be added to make the context clear, and just as often an extra page or two would have been dictated before Dr. Murphy's line of thought ran itself out. His seemingly inexhaustible knowledge of surgery was always at his finger-tips. The manuscript for this last number lacks such additions by Dr. Murphy, and the Editor feels very much as Mr. Jacobson felt when he edited the fifth edition of Hilton's classic book, "Rest and Pain." Mr. Jacobson wrote: "No alterations have been made in this edition. While Mr. Hilton was alive, the Editor felt that he had a freer hand in making any changes in the text or in adding notes to it. But now . . . it has seemed more right to leave his book without further changes."

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* "Clinical Surgery," The New Sydenham Society, London, 1881.

A pen picture of Dr. Murphy teaching in his Clinic has been previously published by the Editor.* No one who has been present will ever forget the manner in which, at the conclusion of an operation, and while the patient was being rolled out and the next patient prepared and brought in, Dr. Murphy was wont to seat himself upon a stool in the center of the arena, and, surrounded by the big family of visiting physicians and surgeons from the far corners of the earth, discourse to them at great length upon the salient features of the operation just finished, correlating similar cases from his vast personal experience. He sat leaning forward cross-legged on the stool, and with elbow on knee, in full operating regalia, earnest, decisive, and incisive, talking in a clear and forceful manner, with a well-modulated though high-pitched voice, and keeping his big family-circle spellbound by his eloquent word-pictures. The writer will never forget the occasion upon which Dr. Murphy showed a patient upon whom he had operated for musculospiral palsy. He had performed the operation of tendon transference of the flexor carpi radialis tendon to the extensors of the thumb and fingers—an operation which he devised and which has been previously

* *International Clinics*, Vol. I, Twenty-fifth Series, 1915.

published in these CLINICS. So perfectly had the power of extension been restored to the fingers that the big family-circle instantly gave vent to prolonged applause, and what the writer will never forget is the gleam of triumph and satisfaction which lit up Dr. Murphy's whole face.

There is no doubt at all that had Dr. Murphy been able to fill out the allotted three score and ten, surgical science would have been further enriched by the creative genius of his fertile brain, for he spoke to the writer of several new operative procedures shortly before his death. It seems the irony of fate that Dr. Murphy should have died from an infection-metastasis, for metastases from primary foci of infection or malignancy formed one of his favorite topics. It would also seem, as Dr. Evans states later, that had this primary focus (the right kidney) been removed many years ago, Dr. Murphy's death would not have been so untimely. The marvelous accuracy with which Dr. Murphy diagnosed his own case and predicted the necropsy findings is described by Dr. Keefe.

In these brief remarks the Editor has endeavored to fill in those few gaps in the surgical biography of Dr. Murphy which were apparent to him after perusing the memorial contributions of Dr. Murphy's colleagues. They were, indeed, few. For further details the future historian is referred to the files of medical periodicals which appeared shortly after Dr. Murphy's death, more particularly *Surgery, Gynecology and Obstetrics* and *The Lancet*. It may be truly said that he bequeathed the profession

> "Thoughts sublime that pierce the night like stars,
> And with their mild persistence urge man's search
> To vaster issues."

In Memoriam

Dr. E. Wyllys Andrews

The head of our Clinic has departed this life, and no one is ready to take up his mantle. No one author in Chicago or America has just the aptitude or industry to carry on this great publication, and satisfy the demands of its thousands of readers. This book must be suspended because its soul is gone. The stream is dried up from which eager colleagues and admirers had learned to get help and inspiration. They will not accept any substitute for Murphy, and they are wise. His chosen vehicle was his own. Each of us must have his one medium of expression, and Murphy's was his Clinic book. It went fresh and pungent to many thousands who had seen and heard him in his amphitheater, and who had admired his keen analytic mind and his virile and electric powers of expression.

Murphy's untimely death, when but fifty-eight, leaves a vacuum in American science. We are dazed as we ponder over it. Subconsciously we realize that a powerful pillar has been removed, and that our prestige and standing in the scientific world are less secure than with him living. We begin to wonder if enough strong men are still among us safely to lead America in the world of surgical progress.

Murphy was an international figure; he had many titles and degrees from foreign countries, which brought honor to America, as well as to himself. He had always been in university work; in college teaching his popularity was phenomenal. He had stamped his influence on many successive classes of students. William J. Mayo once wrote: "As a teacher of surgery by word of mouth, Dr. Murphy had, in my opinion, no equal." As an author, he was widely known and honored in many lands. He was also an inventor and pioneer in surgical research, both clinical and laboratory, for he had struck out new paths and opened many new fields. We need only refer to such subjects as Ileus, Peritonitis, Intestinal Anastomosis, the Surgery of Nerves, of the Lungs, and the Repair and Reconstruction of Bone, to be reminded that in each and all of these he led his colleagues into new fields of progress that will forever be identified with his name.

Honors are also to be showered upon his memory by his friends and neighbors in Chicago, where large sums have been pledged for a memorial or monument fitting a distinguished public man; but when we erect a monument to such a man, we may receive honor as a community, rather than bestow it. He made his own memorial before he left us, for year by year he built himself a monument in the minds of men—*aero perennius*, higher and more enduring than any of bronze or stone. He put the name Murphy, entwined with the word science, where all must see it, and none can assail it, high upon the walls of the temple of science. In Murphy the country has lost a stalwart leader whose name helped to put American surgery to the forefront. We in Chicago have lost the one leader who helped most to make that city a Mecca for the visiting surgeons of the world. Mercy Hospital and Northwestern University are grieved and wounded by his departure. We, his survivors in these halls, can only mourn our departed faithful Chief, and hope as loyally as he to keep up the spirit and morale of good teaching, good writing, and good service. *Comrade, trusted friend, and leader:* VALE!

DR. J. F. BINNIE

To be ordinarily successful in any business a man must be well trained in it—must know his work so well that it becomes mere routine until something new or unusual requires conscious and trained brain work.

To be *very* successful requires something more: it requires that the mind be always on the alert to recognize or create new opportunities, to judge the values of these opportunities, to have both the energy and the courage to seize the opportunities and the judgment how best to take advantage of them.

The *very* successful business man knows thoroughly the routine of his business, but has no time to waste on this routine; he merely supervises what can be done as well or better by less gifted men.

All these qualities the scientist of the laboratory must have, combined with great patience and perseverance. He ought, like the business man, to be able to turn over much or most of his routine work to assistants, and thus conserve his powers for higher ends.

The truly successful surgeon must similarly so train himself that what to others may be arduous, becomes to him easy. What others must reason out laboriously, long study and repeated observations permit him to see and comprehend in a moment. He is enabled to note the unusual in what, to the less educated and experienced, might seem classic, and so he is able to come to a correct and apparently brilliant conclusion.

John B. Murphy had these qualities of greatness in his chosen profession.

As a sculptor sees in the naked block of marble the figure he is about to carve out with his chisel, so could Murphy make an accurate and vivid mental picture of some process of disease and an equally vivid picture of some means to combat it. This is the true scientific imagination—and essential in the make-up of a man who attains the first rank. This genius was shown in the devising of that gem of perfection, the Murphy button; it was shown in Murphy's arteriorrhaphy; in his use of nitrogen to compress and put at rest the tuberculous lung.

A great man can seize the work of others and utilize it in ways never dreamed of by the originator. Langemak studied the origin of traumatic ganglia and of bursæ—an investigation apparently more academic than practical. Recognizing the identity in structure of the synovials of joints and ganglia or bursæ, Murphy was able to produce a bursa—*i. e.*, a synovial cavity—between the divided ends of bone, and arthroplasty became an accomplished fact.

It would be out of place in this short appreciation to endeavor to catalogue the work done by Murphy in advancing surgical knowledge. The list of his achievements is long.

As a clinical teacher Murphy had no peer. To watch the simple way in which he unraveled the history of a patient's ailments, eliminating the non-essentials, weighing the facts lest the apparently trivial should be really essential, and reducing the whole to an orderly story, was an intellectual treat. Then, the systematic presentation of the results of his own examination of the patient, the comparison of these with findings in other cases, a short discourse on the natural history of the disease in question and its proper treatment, were followed immediately by a skilfully planned and executed operation, if such treatment was necessary. Large charts and lantern slide demonstrations were freely used to aid the understanding. Portable microscopes with slides of diseased tissues were passed around, and "results," good, bad, or indifferent, were honestly exhibited or reported.

Some great surgeons could have turned such a clinic into a tiresome ordeal for the visitor—not so Murphy. The dramatic instinct of his Celtic blood was such that everything he said and did hit the mark and hit it sure. No one who has been privileged to attend a Murphy Clinic can ever forget its charm and value.

The rapt attention always given Murphy at the huge meetings of the American Medical Association, at the smaller meetings of the American Surgical Association, at the gatherings of his intimates in the Society of Clinical Surgery, and at meetings of international character, constitute a testimonial that few merit or attain, and outweigh the many formal honors conferred upon him.

Murphy must rank as a world surgeon.

Dr. George W. Crile

The friendship of Dr. Murphy has meant so much personally, and his contributions and his teachings have been of such high value to me, that I welcome this opportunity afforded by the invitation of the Editor of the Clinics to pay my sincere tribute to the memory of the first surgeon of our time.

I shall speak only of Dr. Murphy, the teacher. He taught the nurse, he taught the medical student, he taught the intern, he taught the young physician, he taught the veteran, he taught the laboratory worker, he taught the young surgeon, he taught the master surgeon, he taught the teachers of surgery. He taught us by the example of his earnest, intensive labor on behalf of his most humble patient; he taught by conferences, by lucid clinical demonstrations; he vitalized dull statistics with masterful logic; he wove and epitomized masses of evidence into convincing arguments and drew sound conclusions.

No one could misunderstand Murphy. Each visit to his Clinic resulted in the acquisition of new truths. Every one fell under the spell of the original eloquence of this incomparable teacher. Who can ever forget his stirring addresses, his epigrammatic discussions at our larger meetings? Again and again the audience took the regular program out of the hands of the presiding officer and demanded more and still more from Dr. Murphy. I have never known a man on any pretext to leave his place in the ever-crowded theaters where Murphy spoke.

Dr. Murphy also taught by numerous contributions to medical journals, by editing annuals; he taught by monographs as others have taught by words, and his teachings have influenced not only the American continent, but also Europe and the far East. *He taught the world!* The place of American surgery abroad is due more to the brilliancy of Dr. Murphy's discoveries and their forceful presentation than to the work of any other American. Dr. Murphy has taught the world a surprising amount of what it knows: of what it knows of intestinal anastomosis, of appendicitis, of peritonitis, of ileus, of the surgery of the stomach and gall-bladder, of the genito-urinary tract, of tuberculosis, of surgery of the blood-vessels. Because it was his last chapter, we are apt to think of his preëminence in the surgery of the bones and joints as being his strongest leadership, but in truth his leadership was just as marked in most fields of surgery at the time each field was under his intellectual leash.

We acknowledge all these teachings—but he taught us more: he taught us that the thing that meant more to him than the lavish plaudits of the world was his friends and his beautiful and perfect family life. Dr. Murphy's work and his early death remind one of the lines from Festus—

> "We live in deeds, not years; . . .
> In feelings, not in figures on a dial. . . . He most lives
> Who thinks most, feels the noblest, acts the best."

Dr. John B. Deaver

"Competency is attained and maintained only by zeal, indefatigable labor, and continued efforts in self-education. The responsibilities of his profession rest on the individual man. If he shrinks from its weight, the burden grows doubly heavy. If he short cuts for success, he sinks into the mire of dishonesty and dishonor. If he carries the weight with an erect figure, abiding dignity, and a strong heart, it rides like a bubble."

Thus did John B. Murphy, in his presidential address to the American Medical Association, describe the path of the successful man, and that is the road he pursued throughout his life. Indeed, is it not because of his zeal and indefatigable labor that we are called upon to mourn his passing away before the allotted span of man's life? His sudden death on August 11th was no doubt in large measure due to overwork during the past few years.

After his graduation from Rush Medical College in 1879 Murphy spent three years in practical work and then went abroad for two years, studying in the great European centers, especially Vienna, bringing back with him the inspiration and enthusiasm which characterized his subsequent teachings. On his return to Chicago he soon took his place in the front ranks of his profession, his fame rapidly becoming international as well as national. He was a man of unusual personal charm, striking originality, and exceptional skill. With the boldness of genius he invaded new avenues in surgery none of which has been abandoned by his fellow-practitioners. His early work was done in abdominal surgery, to which period we owe the Murphy button, an epoch-making invention in the surgery of the intestines. No less epochal was his work in surgery of the lungs and blood-vessels. To him belongs the credit of the first successful end-to-end anastomosis of an artery in the human subject, and his also was the original suggestion, when the circulation was to be reversed, of providing two channels instead of one for the arterial blood, by doing a lateral anastomosis instead of an end-to-end union. His contributions to the surgery of the nervous system and his more recent researches in that of the bones and joints are among the most important of his time. To the initiated his work of grafting cartilage and replacing bone tissue was marvelous; to the layman it seemed nothing short of miraculous. His wonderful work in the restoration of ankylosed joints has been most striking, not to say beneficial. It may be said that he has made the lame to walk and the blind to see. But his most noteworthy outstanding achievement, and the one which has redounded more than any other to his fame at home and abroad, is the introduction of the method of saline infusion in the treatment of peritonitis. The far-reaching value of this innovation as a life-saving measure cannot well be overestimated. It has been found indispensable in every hospital and to every surgeon the world over, and will remain so until perhaps another Murphy arises to give us, if possible, something better; yea, it has made Murphy's name a household one in every hospital throughout the world.

Murphy's work abounded in scientific acumen, sound judgment, and unusual technical ability. These were manifested at his clinic at the Mercy Hospital, a Mecca for students all over the country, and indeed from all parts of the world. Here, as elsewhere, he was sure of himself and unafraid; abiding by his statements, radical and unusual though they may have appeared, because they were based on accurate, painstaking research, experimentation, and observation. To a larger and equally interested audience the vivid, fearless, and forceful clinician makes his appeal in that unique and invaluable publication, THE SURGICAL CLINICS OF JOHN B. MURPHY, which has appeared regularly since 1912. The succinct, direct, and simple presentation of the revelations of the operating room contained in these volumes makes them a *sine qua non* to the tyro as well as to the adept in surgery.

The influence of this towering personality was also felt in the broader fields of the medical world. He was a powerful, vigorous public speaker, full of enthusiasm and earnestness, which, coupled with an attractive personality and delightful humor, at once gained for him the attention of his hearers, young and old alike. Whether sounding a warning note against the medical faddist and charlatan; whether insisting on the importance of graduate study, or emphasizing the practical as opposed to the exclusively scientific side of laboratory work for the student; whether defending medical research or dwelling on the value of public health measures, Murphy's every word was delivered with the directness and telling force of a blow in the solar plexus. In short, he was not too proud to fight.

A prime mover in the organization of the Clinical Congress of Surgeons, and its one-time president, the gap caused by his passing is perhaps most vividly brought home to the members of that body. It was Murphy's broad vision also that found realization in the formation of the American College of Surgeons, destined to become a potent factor in placing American achievement on a firm scientific basis.

International recognition came to Murphy when the University of Sheffield gave him the honorary degree of D.Sc.; and in the reward of the Lætare medal from the University of Notre Dame, a distinction conferred annually by that institution on a Catholic layman for conspicuous service to humanity in science, art, or religion. His latest decoration came from the Pope, in June, 1916, from whom he received the Collar and Cross of Saint Gregory the Great. In his own country the University of Illinois and likewise the Catholic University honored themselves by conferring upon him the degree of LL.D.

Though taken off in the prime of life, his performance was ample and great, for he labored diligently, and he labored well.

Sir Rickman J. Godlee

Each number of the Clinics was looked forward to by a very large number of readers in this country not only for the vast amount of instruction they contained, but also for their attractive and racy style. Before they began to appear, John B. Murphy was principally known in the British Isles as the inventor of "Murphy's button," but in connection with this comparatively small matter as compared with the rest of his work his name was familiar to every surgeon and every student for many years.

Those who studied the CLINICS had the opportunity of forming such an estimate of him as the written word can give. But at best it was an imperfect estimate, because Murphy's manner of teaching, original as it was in every sense of the word, belongs to a type not met with in this country, though it seems quite natural on your side of the Atlantic.

Occasionally a photograph of him in his operating theater served to disabuse any misconceptions that might have been formed with regard to his personality; but without actually seeing him at his work and hearing his voice and his earnest manner of speaking, English readers might well be pardoned if they imagined that his teaching was conducted in a somewhat light-hearted manner that was very far from being the case.

When he came over here, as he did on several occasions, and took an active part in discussions on all kinds of subjects at medical congresses, any one could see that he was not, as perhaps many had thought, merely one of the most enlightened abdominal surgeons of the day, but that there was scarcely a branch of surgery which he had not specially studied and enriched. A well-known English surgeon was said to be the greatest general practitioner in Europe; of Murphy it might have been said that he was the greatest general practitioner in America. At these visits a certain number of us became personally acquainted with him and had a better chance of recognizing the width and depth of his knowledge and of appreciating the charm of his character.

I had the great privilege of staying with him in Chicago during the memorable week in November, 1913, when surgeons from far and wide were gathered together to celebrate the birth of the American College of Surgeons. At that time I had many talks with him, and though there was no lack of matter for general conversation, I could not fail to be struck with the fact that, consciously or subconsciously, surgery was always present in his thoughts, and that it was no exaggeration to say that he lived for his profession.

The morning clinics at the hospital were times never to be forgotten. The theater was crowded from floor to ceiling with an enthusiastic audience, not of students, but of doctors, and the rush to obtain the coveted places showed how much his professional brethren appreciated his method of instruction. If I had not been told that it was nothing unusual, I should have supposed that it was the presence of this distinguished audience that inspired him on these occasions. It was evident that he was putting his whole soul into his teaching. He made the most simple subjects exciting, and the most abstruse subjects clear. The didactic style, the word-play with the unfortunate intern, the copious diagrams, and the display of skiagrams kept all his hearers on the alert, and the speed and directions of his operations and the demonstration of successful results were a source of admiration and almost of envy. America rightly boasts of possessing many distinguished surgeons, and it seemed to be recognized that Murphy then occupied the foremost position amongst them.

It was evident that he was working at high pressure, and it is no wonder that he could not bear the strain. A really great man has passed away. Many English surgeons will feel his death as a personal loss. All of them will miss this periodic record of his ripe experience, and will deeply regret that this is the last of those volumes in which he spoke, rather than wrote, his words of wisdom to his brethren in all parts of the world.

Sir W. Arbuthnot Lane

You ask me to say what I feel about our late friend, Dr. J. B. Murphy.

There are very few men who have ever attracted me as he did. He had that wonderful personality that made him the idol of American surgeons and endeared him to all.

His remarkable originality, his comprehensive grasp of every subject he handled, and the dexterity and accuracy of his surgical work filled every one with admiration.

It is impossible to dissociate Dr. Murphy from his operating theater, where I spent many happy hours watching him dealing so skilfully and so successfully with all sorts of difficult surgical problems, and teaching in his inimitable manner the most advanced surgery in the States. That scene will always remain as a very happy and delightful memory of a great man who was universally admired and beloved.

Dr. Murphy owed no small portion of his success in life to the stimulation, sympathy, and tender care which he received from his most capable and devoted wife. We in England share the sorrow and regrets of our American colleagues, since he occupied a very warm corner in our hearts.

Dr. Ernest LaPlace

"Being made perfect in a short space, he fulfilled a long time." These words could scarcely find better application than to John B. Murphy, in whom, through natural ability, the elements so mixed science and skill that the world stamps him as the prototype of the American surgeon.

America is still a new country. The melting-pot of nations, it took time for it to develop the ideal American character, statesman, poet, and artist. In surgery it likewise took time to produce the highest type of a surgeon. Others—Gross, Mott, Senn, Pancoast—have been great, but John B. Murphy was an American to the manner born—an American in bearing, in personal characteristics. He had a lofty conception of his life's work, and was so devoted to the sublime ideal of his art that life and art were one. This was embodied in originality resulting in inventions and discoveries that placed American surgery in the forefront. And withal, the new paths he found seemed so plain and attractive that every one willingly followed—as these were the result of a clearer and deeper vision—through the fog that ever surrounds the horizon of knowledge.

Hence the fruit of his life has been his lofty character as a man—that is, his rule of action was based on righteousness and the courage of living up to it. His ideal was that a useful professional life should add to the edifice of knowledge. He realized the truth announced by Horace, "*Paullum sepultae distat inertiae, celata virtus.*" The impulse for imparting his knowledge and his genius so endowed him that, with compelling force, his audience could not help but listen and learn—anywhere and always. As by an inspiration, that his instructive words might not altogether perish with his life, he gave the world his marvelous clinical lectures, which are the teacher himself as nearly as the printed word can produce sound as well as thought. In these he almost lives to us who have known him. To those who have not been fortunate enough to be under the magic spell of his spoken word, even these lectures are barren of that spirit and gently attracting force that we personally and collectively feel on listening to the really great.

Well may he be to us the ideal American surgeon, whom we may all emulate, but never hope to equal. He died at the pinnacle of American surgery, and has found a niche among the great surgeons of all time.

Dr. Edward Martin

Murphy's splendid gifts to his fellow-craftsmen, and through them to all the nations of the world, were by him, consciously and persistently, based upon his sound knowledge of function, his critical studies of its variants and departures, his tireless pursuit of underlying causes, his power, supplemented by a vision peculiarly his own, the crystal thought of logically deducing a therapeusis which shall be as lasting as the diseases it combats.

In all that he said or wrote or did he was so essentially vital and vivid that he forgot himself, as others forgot him, in the fruitfulness and wonder of his work. An optimist who made his dreams come true; an enthusiast whose doings were greater than his dreams; thinking little of benefits conferred, largely of those he still should bring; rejoicing in the achievements of others, forgetting his own except in their daily application.

Sensitive and reserved, admitting few to that inner man of quick human understanding, ready sympathy, worldly wisdom, keen humor, and boundless loyalty. He conferred a favor in the manner of one gratefully receiving it; accepted one as a debt which could never be cancelled.

> **"Still on high tasks intent, dauntless of will,**
> **In his work the old-time matchless skill."**

THE MEDICAL HISTORY AND LAST ILLNESS OF JOHN B. MURPHY

DR. C. L. MIX

The family history revealed that some members of Dr. Murphy's immediate family died of tuberculosis. He never alluded to the subject to me personally other than to say that his family history showed a few cases of tuberculosis; but friends of his had assured me that he lost two brothers and one sister from this disease, and that on account of his family history he had always taken great care never to expose himself to inclement weather; that on this account he always spent the month of March away from Chicago—either in California or in the south.

When he was a boy in his 'teens, he had a very severe abdominal infection of some sort. He was never able to recall the details with exactness, but upon his somewhat vague recollections he based a diagnosis of appendicitis; and he told me on one occasion that since he never again had trouble with his appendix, he believed he had an abscess of the appendix at that time and had lost more or less of it in the pus-sac that formed. I shall refer to another possible explanation of this earlier trouble when I come to the matter of necropsy findings.

Dr. Murphy's next illness did not occur until he was studying in Vienna in 1883, after graduating in medicine at Rush Medical College. At that time he had a few attacks of hematuria. He consulted at once one of his professors at the *Allgemeines Krankenhaus* at Vienna, who advised him that he had tuberculosis of the right kidney, and suggested that he leave Europe at once. He started for home, but before he had reached the German border his hematuria had ceased, never to return. He did not like to talk about this illness, evidently preferring to believe that it was *not* renal tuberculosis, but essential hematuria. Yet all through his life he had transitory traces of albumin in his urine on overexertion or after great mental strain and anxiety. He recently expressed himself to me as believing that his albuminuria was merely a fatigue albuminuria, such as young soldiers sometimes have after forced marches. Casts were never found, but an occasional red cell showed. In the last four or five years we found an occasional hyaline cast, but neither of us viewed this with any alarm because of his age. Granular casts and signs of nephritis never appeared. I accepted his view in regard to his albuminuria, and it never weighed upon my mind.

In 1888 Dr. Murphy had an attack of typhoid fever, from which he made an uneventful recovery.

His next serious illness took place in 1890, and caused him great alarm. He had but recently married, and being suddenly seized with an obscure pulmonary affection, he was beside himself with anxiety. Certain Chicago physicians at the time advised him that his malady was truly pulmonary tuberculosis. He then went to Philadelphia and saw Professor J. M. Da Costa, who unhappily confirmed the opinion of his Chicago confrères. He then went to New York city and was examined by Austin Flint, who told him that he had a slow pneumonia without a crisis, and that the consolidation had not resolved. The diagnosis of an unresolved pneumonia gave him great comfort. He went west and remained six months. At Dr. Fenger's suggestion he went to Berlin to consult the famous internist, Professor von Leyden. This physician agreed with Austin Flint, and Dr. Murphy ever afterward accepted without question this diagnosis. It was at this time that he brought the first Koch lymph—now called Koch's tuberculin—home. When I first examined Dr. Murphy's chest, some five or six years ago, when he had typhoid fever, it showed no sign whatever of pulmonary tuberculosis in either apex, so that I, too, accepted Austin Flint's diagnosis. Certainly there was not the slightest apical retraction, dulness, or prolongation of the expiratory murmur in either apex to denote an obsolete tuberculosis.

He remained well for ten years, until 1905—eleven years ago. At this time he had a severe pain in his left arm and shoulder, which he attributed to neuritis. The etiology was obscure, but the pain severe. By having his arm supported in a sling above his head as he lay in bed the pain was tolerable. He got well at Glenwood Springs, Colorado, and was never troubled again. Whether there was at that time an element of angina in the pains I do not know; but in the light of later developments one wonders what the nature of this brachial neuritis really was.

Following this Dr. Murphy was well and vigorous. He had a tremendous amount of what the Germans call *innere Betrieb*,—an inner driving force,—which was so powerful that it wore out his associates but never seemed to tell upon himself. At length, in 1911, he went to Florida for his usual March trip. Here, at the age of fifty-two, he most unfortunately contracted typhoid fever. His was one of seven cases, one of which was fatal. The epidemic was studied by Professor Jordan and Dr. Ernest Irons, and was traced to a typhoid-carrier in a dairy near Tampa. Besides the seven hotel cases, Dr. Irons found twenty cases in Tampa which were traced to the same source.

Dr. Murphy's case was rather severe. He was never delirious, and his fever was seldom above 102.5° or 103° F., but he had a severe diarrhea at times. He had one complication—prostatitis with much swelling of the prostate and very severe pain. Our cultures gave us *Bacillus coli communis*. The prostatitis quickly disappeared, and his convalescence went on in the usual way. There was a constant leukopenia,—5000 and 5500,—even during the prostatic irritability, but we never got a frank Widal reaction. The clumping was never marked and motility never ceased. We sent to Washington for some paratyphoid strains and tried certain strains in Chicago, but never got a good Widal. Clinically, the symptoms, the temperature range, its duration for twenty-six days, its cessation by lysis, the gain afterward, all confirmed the diagnosis. It was further definitely proved by the other six cases of the disease, the outbreak of which was so ably studied by Irons. Beyond a doubt this attack of typhoid fever had a profound effect in developing his aortitis.

Dr. Murphy's first anginal attack came but a few months after his recovery from typhoid fever. He was alarmed about it, and asked me to examine him. I did so, and told him his trouble was symptomatically angina, even though I could find no signs of an aortic lesion. He would have none of that diagnosis. "What do you mean by angina pectoris?" he asked me. And when I explained that I meant a morbid process secondary to an aortitis or to coronary sclerosis, and that I did not believe in pseudo-angina, believing all anginas to be true, if they were anginas and not vasomotor phenomena, he would not accept the diagnosis. He then went to Dr. Frank Billings, who told him that these attacks *were* angina, and when he next met me confessed that we were probably right.

In 1912 another mysterious illness greatly weakened him. In four or five weeks he lost sixteen pounds from an obscure diarrhea. I could not find the cause, notwithstanding a very careful search of the stools. Dr. Murphy suggested that together we see Dr. B. W. Sippy, which we did. He was equally unsuccessful in reaching the cause. He believed the diarrhea to be fermentative, but his suggestions in nowise abated the very frequent bowel movements.

At about this time there came to the Northwestern University Medical School, as Professor of Bacteriology, Dr. Kendall, straight from his work in Boston in the diarrhea of infants, where *Bacillus aërogenes capsulatus* was found to be the etiologic factor. While speaking to him of his work, it flashed upon me that perhaps Dr. Murphy's case belonged to this type. I myself took a stool to Dr. Kendall. He found the bacilli even in a smear, and on testing out cultures in milk got the gas bacillus in almost pure culture. Having found the causative organism, and knowing that the bacillus must have carbohydrate material for its food, we stopped all milk—which contains milk-sugar—and every form of starch and sugar. The change for the better was immediate, and very shortly the patient was cured. His diarrhea never recurred. His was the first case of diarrhea due to *Bacillus aërogenes capsulatus* that I had ever found. Since then I have met with several cases. Whether this illness, which was very serious during the two months it lasted, caused any accelerated development of his aortitis I do not know: presumably it did do so, for after this his attacks of angina, which were several months apart and very mild, began to occur more frequently.

During 1913 and 1914 Dr. Murphy was reasonably well, though he constantly alarmed his family and me by insisting upon being too active. To the best of her ability Mrs. Murphy got him away on vacation trips, but his love for his work—for the work itself, alone and of itself—was overpowering. He was a doctor of the old school,—one of the "Bonnie Briar Bush" type,—though only his intimate friends knew this side of his character. To suffering poverty he was kindness itself, and this love of work for itself alone was really the cause of his undoing.

During the winter of 1915 to 1916 the anginal attacks became so severe as temporarily to interrupt his work. His associates noted the "spells" (as they called them) and were alarmed, but he guarded the secret even from his wife: during the early course of his trouble I believe that Dr. Billings, Dr. Babcock, and myself were the only ones to whom he confessed that he was having attacks of increasing severity. On one of these occasions—in the fourth floor operating room—he was suddenly so afflicted that he had to lie down upon the floor momentarily; yet so unwilling was he to admit serious possibilities to himself that, though I was in Mercy Hospital at the time, I did not learn of it until later, through Sister Ethelreda, his anesthetist. And when I started to speak about it he waved the whole affair aside, saying that the room was too hot and that he was dizzy.

Attacks of vertigo during the last year grew more frequent, and when I recently learned that aortitis, by a reflex through the cardiac branches of the pneumogastric nerve, is responsible for many of the vertiginous attacks formerly ascribed to cerebral arteriosclerosis, I became the more alarmed. On December 27, 1915, he had a severe attack of grip and was confined to bed for three days. There were purulent discharge from nose and throat and temperature of 101° F.

At length, about April 9, 1916, things came to a climax. I saw Dr. Murphy at his home. He was in bed, and had had a terrific anginal attack. He also had a temperature of 101° F. and a septic sore throat on the right side. Cultures proved the latter to be streptococcic in type. It quickly cleared with compound elixir of salicylic acid, but his anginal attacks grew worse. He was sure that eating breakfast brought on the attack each morning, so he would not eat. In reality it was the exertion of getting up to eat that brought on the attacks, as we demonstrated by allowing him to go without his breakfast *with* exercise, the anginal attack appearing, and then having him eat his breakfast in bed *without* any exertion whatever, no attack appearing. It was then only that Dr. Murphy seemed to realize that he could not keep up his former pace. By the end of April he was so far improved that, despite my expostulations and those of Mrs. Murphy, he insisted upon performing a few operations the first week in May on some patients who had been in hospital several weeks waiting for him to get better.

Early in May he said he would do anything I advised, so we agreed that he should go to Atlantic City to rest; that he should cancel his paper at the Detroit meeting of the American Medical Association; that he should stay in the East until the middle of June; that he should then go to the Chicago Golf Club at Wheaton and spend the summer there, and that he should not return to Mercy Hospital until September 15th; that on his return he should do nothing except direct operations, and that his office hours should be cut down perhaps to three days per week instead of five days. (Dr. Murphy never kept Saturday afternoon office hours.) This fall he was to spend largely upon a book on surgery.

These plans were carried out strictly up to the time of his death. He remained in the East until June and then went to Wheaton. Here he was very inactive. He played no golf, though he did a little putting each day. Nine days before his death I went out to Wheaton and spent part of the day with him. I also examined him again physically on that date.

The last time I saw Dr. Murphy was the Monday before his death. He stopped at my office on his way to the train that was to take him to Mackinaw. He had during the previous six days gone down hill tremendously. He had lost several pounds in weight simply because he would not eat. As soon as he ate a mouthful he would have a tremendous attack of angina. He had already sent a specimen of urine to his laboratory that day, and while we were talking we got the report over the telephone. It showed sugar,—½ of 1 per cent.,—acetone, and diacetic acid. He was then in a state of acidosis. He knew it because of his strange change in ability to focus in his vision; and he complained of a peculiar taste and of marked thirst and thirst in the night, symptoms which he never before had had. Though very numerous samples of urine had been examined in the last few months, no abnormality had ever been found. We discussed the advisability of his going to Mackinaw. With his usual great fortitude he questioned whether he would ever get back alive. Yet it was so intolerably hot at Wheaton that he felt he would die if he remained there. Perhaps I should have insisted upon his not going. I left it to him. He said he would not back out, because the heat was unbearable. He could not live if he could not get out of it. This feeling was one which made Mrs. Murphy wonder. She said that Dr. Murphy always stood heat remarkably well, and she could not understand how he suddenly found it impossible to remain at Wheaton. It was really the acidosis which brought on this feeling. I believe it to have been a starvation acidosis. He had refused to eat, because eating brought on the anginal attacks; and he had used up his liver sugar and could not get sufficient carbohydrates to give a proper "mixture" for his metabolism, to adopt Woodyatt's metaphor. The acidosis was sudden in onset and severe. I advised that he take 120 grains of bicarbonate of soda four times daily and that he eat some carbohydrates. He left for the train with a faded look in his eyes that made me feel when he left that he would never work again. And in our usual vernacular, when his former associate, Dr. Golden, whom he did not see on this last occasion, asked me how Dr. Murphy was, I replied, "He is all in." And so bad was he that I laid all my plans to go to Mackinaw the following Sunday. On Friday, August 11th, however, Dr. Keefe's despatch came about 5 P. M. notifying me of his death at 3.30

P. M. A later despatch from his old friend, Dr. W. A. Evans, confirmed the sad news.

I examined Dr. Murphy several times. His lungs never showed signs of tuberculosis, as already stated.

Examination of his heart and blood-vessels was equally negative, to within six weeks of his death. The blood-pressure, taken a great many times in the last three years, was always low,—usually 130,—and his diastolic pressure ranged from 80 to 90. A set of three skiagrams was made in 1914, and a similar set made in April, 1916. Neither set showed cardiac enlargement or widening of the aorta, or any evident aortic lesions. Coronary sclerosis seemed not very likely because there was no bradycardia. Most cases of coronary sclerosis show a marked slowing of the beat. There was never an aortic systolic murmur, so common in aortitis; no sign of aortic insufficiency and scarcely any accentuation of the aortic second sound—taking into consideration the patient's age (fifty-eight years). In June, when he returned from Atlantic City, for the first time we noted arrhythmia and inequality—always the sign-posts of myodegeneratio cordis. But this arrhythmia, the inequality, and the intermittency were not marked: they were not associated with a change in the pulse-rate, which remained in the eighties, where it had been for several years.

Examination of the abdomen was likewise negative. The gall-bladder never gave him a particle of trouble. His anginal pain was often very low, so that the pancreas was suspected of being implicated, but it was not tender on very deep palpation, so that we dismissed from our thoughts any subdiaphragmatic trouble. Neither kidney was tender; the liver was not enlarged or tender, and the spleen was normal.

We, therefore, were of the opinion that in its evolution the trouble possibly began eleven years ago, with the neuritis in the left shoulder and arm; that it was quiescent until lighted up by the typhoid fever and the attack of *Bacillus aërogenes capsulatus* diarrhea; that there was a mildly degenerative aortitis, as is usual in such histories; that the streptococcic sore throat led to a metastatic streptococcic aortitis. And I tried to comfort Dr.

Murphy by telling him that he probably had not very much degenerative aortitis, but a good deal of acute infectious streptococcic—possibly ulcerative—aortitis; that with rest and care he could get over the infectious part of his aortitis, and that he would then have the degenerative part alone to bear; that the sore throat had exacerbated a chronic process, but that the acute side would gradually calm down, and things would be as they were before. Yet we both were sure that he had streptococcic ulcerative aortitis, and it was this belief which made him ask that a necropsy be made.

Dr. W. A. Evans gives an account of these findings. They quite harmonize with the history and clinical findings. Whether the boyhood illness was appendicitis or tuberculosis of the right kidney is open to question. It might well have been the latter.

The distribution of the aortitis was in accordance with the pain. A great deal of the pain was low,—as low as the pancreas,—and much of the atheroma was in the abdominal aorta. The extensive pleuritic adhesions were noted by neither Dr. Babcock nor myself, and we failed to note the existence of coronary sclerosis, which can exist without physical signs. But the diagnosis of angina could not be missed, nor could the eventual termination of this dreadful malady be postponed. Dr. Murphy knew this as well as anybody, and he told me that he would much rather die at once than linger as an invalid. "If I am through," he said, "I want to quit right away. I don't want to linger after my work is done." For himself he had no fear of death. He was familiar with it in all its aspects. If it was his turn, he could go cheerfully without making ado. And he died as all brave physicians die.

DR. R. H. BABCOCK

There is very little I can say with regard to Dr. J. B. Murphy's case. He consulted me on two occasions, first on April 7th last, and again in July. He stated that he first noticed his chest pain six years before, but that it was only recently that it had become so intense as to compel him to stop walking or cease any other effort calling it forth. His description of the pain was typical as to location and intensity, but there is no record of his having dwelt on a sense of impending death, although in a subsequent talk over the telephone he mentioned a severe and prolonged attack which he declared to his attending physician would kill him unless he were relieved.

The result of my examination was practically negative on each occasion. The pulse was regular, 90, and systolic blood-pressure was 130, with a diastolic of 100. This was a rather high minimum pressure, and gave a pulse pressure of only 30, which in light of the necropsy was a significant finding. The apex-beat was not palpable, and deep cardiac dulness measured 15 cm. in its transverse diameter, or 11.5 to left and 3.5 to right of the median line. The heart tones were all clear and free from murmurs or any noteworthy features save that the aortic second was somewhat accentuated and of a slightly metallic quality. With the exception of a slight visible retraction of the left apex, the lungs showed no abnormality. The liver was palpable, but not sensitive. There was tenderness to pressure over the pectoral muscles on the left, and several of the teeth suggested the probability of suppuration about their roots.

Although the diagnosis recorded on my history sheet was angina pectoris, yet, in consideration of the practically negative cardiac and vascular findings, I inclined to the view that the coronary arteries were not responsible for the pain and that this was influenced or exaggerated by the soreness of the pectoral muscles. Moreover, I recognized that Dr. Murphy was exceedingly frightened and apprehensive in regard to the nature and significance of his angina (an anxiety which we now know was justified), and this also contributed to my opinion that the pain was not so serious as the doctor thought. I told him accordingly that I believed the angina was not a coronary angina, and thought it would grow less with time and care on his part to get rid of any possible focus of infection in the mouth.

He subsequently told me over the telephone that he believed my view to be correct, since soon after consulting me he experienced a sharp but short-lived streptococcus infection from the posterior nares, and with its subsidence had been considerably relieved of his angina. When, however, he saw me again in July he had been reading Allbutt's latest contribution to the subject of angina pectoris, and expressed the conviction that he was suffering from acute aortitis, the condition attributable to his streptococcus infection above mentioned.

I now think my hopeful view of Dr. Murphy's case was due in considerable part to my disinclination to admit its real significance in one of such professional eminence, to which also must be added my belief that fear on his part exaggerated the intensity and significance of the pain.

The lesson to be learned from this unfortunate case may be expressed in few words: Never regard lightly a substernal pain in an elderly patient, particularly a man, even though the cardiovascular findings may be wholly negative. The gravity of the condition is not always to be measured by the intensity of the symptom, especially if there be associated a sense of impending death, though this latter may be no more defined than a dread or anxiety felt at the time of the pain. Exact diagnosis may be impossible at first, but it is better to be too cautious than too optimistic in expressing an opinion concerning the nature and outcome of the pain.

DR. J. E. KEEFE

On Wednesday afternoon, August 9th, Dr. Murphy requested me to make notes on some statements that he wanted to make. He had been drowsy all day, and we had sent a specimen of urine to the laboratory. He told me that he thought he was going to die. He asked me to make reservations for the trip home.

In the event of his death he wanted a necropsy made, and wished to state his estimate of the nature of his trouble—his explanation of it. His statement, jotted down on a piece of paper, was substantially as follows: "I think the necropsy will show plaques in my aorta. I had an infection of the kidney thirty-three years ago—probably that is the origin of my trouble. I had appendicitis when a child, but have had no symptoms since. Since my trouble began I have had a constant pain or uneasiness in the region of my pancreas. The pain is dull and steady. I cannot help feeling that the seat of my trouble is deep in the abdomen in the region of the pancreas. I think they will find that my trouble is due to metastasis from some point not causing any discomfort.

"The acute infection of my nose a few weeks ago added to the metastatic infection, but that is not the chief source. The chief source will be found in some area in which I have no discomfort. I think I could have won against my original trouble. I expected to win all the time until last Monday, when I found that I had sugar in the urine and acidosis. That, on top of the other, is too much for me. The acidosis is a starvation acidosis, but I cannot eat without causing pain."

Later in the afternoon Dr. Murphy felt better. He said he was free from pain in the pit of his stomach for the first time since his illness began. He dictated several letters and telegrams, was clear in mind, bright and cheery. On Thursday he was drowsy, sleeping most of the day. Early Friday morning attacks of angina began. This lasted until his death from angina at three that afternoon.

CORRELATION OF NECROPSY FINDINGS

DR. W. A. EVANS

Dr. Murphy frequently said that he thought he had had an attack of appendicitis during his childhood. The necropsy made by Dr. W. H. Burmeister showed:

"The appendix extends down and laterally from the cecum and is firmly adherent all the way to the tip to the overlying ileum. The appendix lies behind the ileum, and is firmly bound by adhesions posteriorly and parallel to ileum. It is 10 cm. long, and when flattened out has a maximum thickness of 3 mm., and the lumen is apparently obliterated."

It is probable that Dr. Murphy had an attack of appendicitis which practically obliterated the lumen of the appendix during his childhood.

In 1883 some one in Vienna diagnosed tuberculosis of the right kidney in Dr. Murphy. The basis of the diagnosis was a profuse hematuria coming from the right kidney. I have never heard that tubercle bacilli were found. After a few days the discharge of blood stopped. After that Dr. Murphy occasionally, when fatigued, had a little albumin, a few red blood-cells, and a few leukocytes in his urine. He never had a frank hematuria after the first attack.

The necropsy showed as follows: "In the right renal region is a small mass of kidney tissue, measuring 3 x 2 x 2 cm. It is lobulated, and the perirenal fat is adherent to it by firm fibrous tissue. The renal artery to this side will not admit a fine probe-pointed scissors. On sectioning through the center of the mass of this tissue the central portion appears as an irregular caseous mass, the edges of which are firm. The center is pultaceous. This necrotic area measures 2.5 x 1 x 1 cm., and is surrounded by a zone of what appears to be renal tissue, the maximum thickness of which is 3 mm. The pelvis and ureter are still patent, and the circumference of the ureter is 3 mm.

"Around the left kidney the perirenal fat is abundant, with great numbers of fibrous bands running through it, so that the fat is removed with difficulty. The left kidney is large, and the fibrous capsule strips with some difficulty, but leaves a fairly smooth surface, although in some portions the parenchyma is torn away with the capsule. The kidney measures 14.5 x 5 x 7 cm. There are faint evidences of fetal lobulation still present. The consistence is very much diminished. The surface made by sectioning this kidney is reddish-green in color. In the mid-portion and about the equator is a small cyst, 1 cm. in diameter. The fine radiating cortical structure is indistinct. The cortex varies in thickness from 0.8 to 1.2 cm. The pelvis is dilated. The ureter is patent throughout and contains no scars. The kidney weighs 227 grains.

"*Anatomic Diagnosis.*—Chronic tuberculosis(?) of right kidney. Secondary atrophy of left kidney. Small cyst of left kidney. Cloudy swelling of left kidney. Fibrous perinephritis. Fetal lobulation of left kidney."

Histologic Report on Right Kidney.—"There is considerable chronic proliferation of the connective tissues. This process is progressive. There is proliferation of the endothelial cells of the capillaries and production of new capillaries. Some of the small blood-vessels are choked with leukocytes. There are not many leukocytes in the tissues. Most of the cells in the tissues are large lymphocytes and cells of endothelial origin. There are no giant-cells. The kidney-cells are in most instances swollen and loosened from the basement membrane. In the neighborhood of the broken-down area the cells are undergoing necrosis."

Histologic Diagnosis.—Chronic persistent infection of the right kidney, probably due to some organism other than the tubercle bacillus. That the infection is probably not tuberculous is inferred from the absence of giant-cells and the vascularity of the nodules. "The histology of the left kidney is that of acute cloudy swelling. The size of the kidney indicates compensatory hypertrophy."

My opinion is that there was an infection of the right kidney, which began in 1883 and which had persisted since. I do not think it was tuberculous. At the time of death the kidney was almost, though not entirely, obliterated. It was capable of functioning to a slight extent. The prostate gland was normal.

In 1888 Dr. Murphy had an attack of typhoid fever from which he made an uneventful recovery.

In July, 1890, Dr. Murphy had an attack which some of his physicians pronounced pulmonary tuberculosis, and others a slowly resolving pneumonia. He went to Colorado and remained there for six months.

Necropsy Report.—"Entire left pleural cavity is obliterated by firm fibrous adhesions. Right pleural cavity posteriorly is obliterated by continuous adhesions. Anteriorly, over middle and upper lobes, these adhesions occur as strands and are not continuous. No gross scar is to be found in apex of either lung, although the pleura of these portions is thickened. The lungs are normal."

The probability is that the attack in 1890 was one of pleurisy. It may have been an attack of pneumonia with pleurisy, but that would not account for the adhesions in both lungs. If it was pneumonia, there was no pathology suggesting that at the time of death. Dr. Murphy never had pulmonary tuberculosis.

For several months prior to his death Dr. Murphy had suffered at times from a substernal, occasionally radiating, pain, which was diagnosed angina pectoris. He frequently referred to his discomfort in the epigastrium, connecting it up with the substernal pain.

Necropsy Report on the Heart.—"Coronary arteries; thoracic and abdominal aorta: In the epicardium of left ventricle anteriorly is a grayish patch, somewhat irregular in shape, extending roughly 1.8 to 1.3 cm. in its greatest dimensions. The subepicardial fat is quite abundant. The heart is slightly enlarged, especially the right ventricle. The wall of the right ventricle measures 4 cm. in thickness. The tricuspid ostium admits three fingers snugly. The endocardium covering the leaflets of pulmonary valves is smooth; valves almost transparent; they are thin. The mural endocardium is smooth and shining throughout. The cavities of the right ventricle and right auricle are slightly dilated. The myocardium of the left ventricle is pale brick-red in color. The wall measures 2 cm. in thickness. The cavity is very slightly dilated. The myocardium is quite friable. In the myocardium of the left ventricle, just beneath the grayish, opaque area in epicardium the muscle appears softened and somewhat disintegrated to a depth of 3 mm. Both coronary arteries were open for a distance of several centimeters from their mouths. They contain numerous patches of calcification which are not limited to the media, and in places almost through adventitia. The lumina are almost obliterated in places. In the endocardium of the anterior leaflet of the mitral valve is a series of yellow plaques, the largest of which measures approximately 1 x 1 cm. in its maximum dimensions. The leaflets of the aortic valves present a thickening of the corpora Arantii, one of which is partly calcified. In the intima of the aorta, at the bottom of the sinus of Valsalva, are calcified nodules which almost outline the insertion of the valves.

"In the intima of the ascending portion of the arch of the aorta are from 15 to 20 minute plaques, in part discrete and in part confluent, which are most abundant in the first 4 cm. of this portion. The largest of these have maximum dimensions of 1 to 3 mm. The circumference of the ascending portion of the aorta measures 7.6 cm. Measured in the arch of the aorta, it is 6 cm. In the arch of the aorta is an atheromatous plaque just in that portion which overlies the left bronchus. The intima has broken down and the media lies exposed. This process appears to be limited to the intima for the most part.

"In the descending portion of the thoracic aorta are great numbers of these plaques, several of these having ulcerated. In the abdominal aorta these plaques are more numerous, and practically all are broken down and ulcerated."

Anatomic Diagnosis.—"Clubbing of fingers. Localized fibrous epicarditis. Slight hypertrophy of the myocardium. Slight acute dilatation of the right ventricle. Acute myomalacia of wall of left ventricle. Slight calcification in leaflets of mitral and aortic valves. Arteriosclerosis of coronary arteries. Arteriosclerosis of aorta."

Dissection of Coronary Arteries and Description of Findings by Dr. A. H. Baugher.—"*Left Coronary Artery.*—Sclerosis is distributed along anterior and posterior branches of artery, and atheromatous deposits are almost continuous. The mouth was completely surrounded by atheromatous patches, as was the mouth of the two branches. About 5 cm. from its mouth the posterior branch was almost completely closed, and about 1 cm. from this point was a large atheromatous patch measuring 3 mm. in length and located on one side of the artery.

"*Right Coronary Artery.*—Had atheromatous patches, though sclerosis was not so great as in left coronary.

"*Report on Histology.*—The myocardium shows a moderate amount of interstitial myocarditis. The parenchymatous degeneration of the myocardium is fairly well developed. The arteritis is an endarteritis. The thickening of the intima is in patches. In places there are necrosis and calcification. The necrotic process begins in that portion of the intima next the media. Here and there in the media are small islands of round-cells, mostly perivascular. This is true also of the adventitia.

In most of the areas examined the endothelial covering of the arterial wall can be demonstrated."

Comment.—The atheroma of the abdominal aorta extending as far as the bifurcation was an old process. It had existed for years. In the lower abdominal aorta the several atheromatous patches had become atheromatous ulcers. The atheromatous process in the thoracic aorta and in the coronaries was recent. Necrosis of the plaques had not begun or had not proceeded far. There was but one atheromatous ulcer in the thoracic aorta.

Two weeks before his death Dr. Murphy noted an unnatural thirst. This did not become very troublesome until August 6th, five days before his death. On August 6th he found that he had lost 15 pounds in approximately one week. On August 6th the urine was examined, with the following result:

EXAMINATION OF URINE

Voided....*August 6, 1916.*
Date....*August 7, 1916.*
Dr. *Evans.* Name of Patient....*Dr. Murphy.* Room....Ward...
Quantity *Single* + Cloudy....*Clear.* Sediment....*Slight.*
Twenty-four hours.
Specific gravity..........*1030* Reaction..........*Acid, 30°*
Albumin....+ Per cent........Amount twenty-four hours....gm.
Haines, Fehling, and Wylander all positive.
Sugar..++ Per cent...*5 per cent. estimated*...Amount twenty-four hours....gm.
Acetone..++ Diacetic acid..+ *distinct.* Urea amount twenty-four hours....gm.
Casts..*few* +*hyaline and cylindroids.* Red blood-cells......*0*
White blood-cells..........*0* Epithelial cells.......*0*
Crystals.................*0* Amorphous..........*0*
Miscellaneous.............*0* Bile................*0*
Ammonia content *0.5 gm.* Estimated on 3000 c.c. basis.
Examined by....*Albert Howard Baugher.*

Dr. Murphy remarked to me over the telephone that he was drinking large quantities of liquids, and said that the output must be at least 3000 c.c.

A second sample, taken on the ninth, was analyzed, with the following result:

Examination of Urine

Specimen voided *August 9, 1916.*
Date....*August 11, 1916.*
Dr. *Evans.* Name of Patient....*Dr. Murphy.* Room....Ward......
Quantity *Single* + Cloudy....*Clear.* Sediment....*Slight.*
Twenty-four hours.
Specific gravity....*1031* Reaction....*Acid.*
Albumin..*Present. Trace heat and acetic acid.* Per cent.....Amt. twenty-four hours....gm. estimated.
Sugar....++ Per cent...*Est. 6 per cent.* Amount twenty-four hours..*180*..gm.
Acetone..++ As preceding examination. Diacetic acid..*Increased over.* Urea amt. twenty-four hours. Previous examination very distinct.
Casts..+ *hyaline, cylindroids.* Red blood-cells......*0*
White blood-cells...................... Epithelial cells.......*0*
Crystals............................... Amorphous..........*0*
Miscellaneous.......................... Bile................
Ammonia content *0.53 gm.* Estimated on 3000 c.c. basis.
Examined by....*Albert Howard Baugher.*
Urine was at least forty-eight hours voided.

Necropsy Report.—The pancreas measures 25 x 2 x 2 cm., and is firmly lobulated. Stomach empty. Pyloric sphincter is markedly contracted, measuring 2.5 cm. in circumference (constriction possibly due to postmortem changes on previous injection of formalin). There is no hypertrophy of the pyloric end of the stomach. Mucosa of stomach appears unchanged and clean. No gross changes anywhere in mucosa of small intestine. No scars. Mesenteric lymph-nodes are not enlarged and present no scars or ancient lesions. The small bowel is almost empty, except the lower 20 cm. of the ileum, which contains some grayish fluid. The large bowel is also empty and is normal in appearance.

Report on Histology of Pancreas.—There is an increase in the thickness of the walls of the small arteries. This process is not in plaques. There is an increase in the connective tissue in the walls of the larger pancreatic duct radicles. There is no material increase in the general interstitial tissue of the organ. There is a slight degeneration and cloudy swelling of the epithelial cells. No marked necrosis of the islands of Langerhans can be demonstrated.

Conclusions.—Dr. Murphy's death was due to angina pectoris. The cause of the angina was atheroma of the coronary arteries. The lesions in his coronary arteries and in his thoracic aorta were younger by several years than those in his abdominal aorta. The cause of the pain in the epigastric region was the atheroma of the abdominal aorta, perhaps as a result, as Allbutt has claimed, of stretching of the outer arterial coats. The probable seat of the old metastasis was the chronic thirty-year-old infection of the right kidney. The probable explanation of the acidosis was starvation. Eating increased the anginal pain, and in consequence Dr. Murphy ate very lightly. His gastro-intestinal tract was empty at autopsy. Why he developed glycosuria during the last two weeks of his life I cannot say. There was an obliterative arteritis in the arteries of the pancreas, thickening of the connective tissue around the pancreatic ducts, and slight degenerative changes in the pancreatic cells; but I would not care to say that this was the cause of the glycosuria. Had Dr. Murphy's right kidney been removed in 1883, or at any time within twenty years thereafter, I think his arteritis would have been prevented.

OSTEOSARCOMA: REPORT OF EIGHT RECENT CASES. REFERENCE TO SIX CASES PREVIOUSLY REPORTED

BY ALBERT H. BAUGHER, M.D.

In the following paper on osteosarcoma I wish to give a brief account of each of eight recent cases occurring in our Clinic. These cases have not been reported, with the exception of the one on sarcoma of the ilium. A preliminary report of this case with comments by Dr. Murphy on the procedure to be followed may be found in the August, 1916, issue of the CLINICS. I shall not attempt to draw deductions from these cases at this time, as the chief purpose of this paper is to stimulate interest toward an early study of tumor formations in bones. The advice or treatment given in each case I believe conforms with the teachings of Dr. Murphy, and in this regard I wish to refer to the following articles by him:*

Murphy CLINICS, II, April, 1913, p. 321. Woman, aged forty-six; periosteal sarcoma of lower end of femur complicated by phlebitis. Amputation through upper third of thigh. Patient died about one year following operation.

Murphy CLINICS, II, April, 1913, p. 334. Also see *Surgery, Gynecology and Obstetrics*, May, 1913, p. 493. Man, aged forty-one; chondrosarcoma of trochanteric region; resection of involved area and head of femur; transplantation of bone from tibia; bone regeneration progressing favorably one year following operation. Patient not allowed to bear weight on transplant at this time, but can move hip-joint in all directions. Patient died from metastases in the lung early in 1915.

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* These articles by Dr. Murphy were written to illustrate different types of osteosarcomata and, therefore, do not represent a series of cases.

Murphy CLINICS, II, April, 1913, p. 335. Also see *Surgery, Gynecology and Obstetrics*, May, 1913, p. 493. Girl, aged fourteen; chondrosarcoma of upper end of tibia; resection; transplantation from other tibia. Patient is now nineteen years of age and walks without a cane or crutch.

Murphy CLINICS, II, December, 1913, p. 1082; traumatic sarcoma of femur; inoperable because of infection and extent of tumor. Series of skiagrams showing rapidity of growth.

Murphy CLINICS, III, August, 1914, p. 783; advanced mixed spindle-and round-cell sarcoma of head of right humerus; resection; six weeks later attempted transplantation from tibia, but found recurring sarcoma. Amputation. Patient died latter part of 1915 with metastases in lung.

Murphy CLINICS, IV, February, 1915, p. 93; mixed round- and spindle-cell periosteal sarcoma of right femur. Disarticulation at hip. Patient well two years after beginning of trouble.

Murphy CLINICS, V, August, 1916, p. 683. Sarcoma of manubrium. Resection May 5, 1916. No evidence of recurrence, but wound broke down after closing and a sinus still persists, but is closing favorably. Patient is receiving Coley serum and x-ray treatment.

Murphy CLINICS, V, August, 1916, p. 719; sarcoma of ilium. See report below.

I wish to thank Drs. Golden, Hochrein, and Kreuscher for the material used in this report.

CASE I.—Patient of Dr. John F. Golden's. A single man, aged twenty-seven, entered Mercy Hospital May 20, 1916, complaining of a fracture of the left femur just above the knee. During January of this year the patient began to have occasional dull pains in this region, first noticed after he had been running on hard frozen ground. One week following this exertion and exposure he found that the pain was becoming more severe. He consulted a physician, who treated him for "rheumatism," but without relief. During the latter part of March a swelling gradually appeared on the inner side of the left thigh, in its lower third. It was slightly painful, and on x-ray examination was found to be confined to the lower end of the femur. The patient kept working, although he experienced considerable pain, the severity of which varied from time to time, but was not influenced to any extent by motion.

On May 7th, while walking to the physician's office, his leg gave way and he fell to the ground. The pain was severe, and he could not rise to his feet. He was taken to a hospital, where a diagnosis of fracture was made. It was reduced, and a splint

Fig. 214.—Skiagram showing pathologic fracture of femur at site of sarcomatous involvement.

applied. For the following forty-eight hours the pain was very severe. A few days later he was advised to come to our Clinic. At this time the skiagram (Fig. 214) and tissue examinations confirmed the diagnosis of sarcoma. There was no evidence of metastases. Amputation was advised because of the size of the tumor and because of the apparent activity of the cells composing it.

The patient submitted to this operation, which consisted of amputation four inches below the great trochanter and the removal of a diseased inguinal lymph-node, both on the left side. The tumor was found to be situated in the lower third of the femur, and extended to within 5 cm. of the condyles, the articular surfaces of which were intact (Fig. 215). The bony structure of the femur was completely destroyed for a distance of 3 cm. from the lower margin of the tumor, and for an additional distance of 5 cm. was badly eroded. The tumor measured 14 x 11 x 11 cm., and was completely encapsulated, and when sectioned marked bulging took place. The periphery of the tumor was composed of lobules varying in diameter from 2 to 4 cm. The greater number of these lobules were composed of a whitish-gray, cheesy material, but some of the lobules, however, were composed of a reddish, soft material. They were quite easily separated from each other, and were definitely outlined at the periphery. A few blood-cysts, measuring about 2 cm. in diameter, were found in the tumor. Microscopic examination revealed giant-cells, large polymorphous cells, spindle- and round-cells (Fig. 216). Many mitotic figures were found throughout the tumor, as also were many lymph- and blood-spaces (Figs. 217, 218). A perithelial type of growth was easily demonstrated. This feature was confined chiefly to the lobules. The giant-cells in this tumor are not so uniformly present, and are distinctly different in character from those that are usually found in the so-called myelogenous giant-cell sarcoma. They correspond to the type described by Mallory as being true tumor-cells. Senn, in 1895, also accurately described two types of giant-cells occurring in sarcomata of bones. This tumor was regarded as a very malignant one, probably originating in the periosteum. The left inguinal lymph-node showed no evidence of metastatic invasion.

The patient made a good recovery and has had no symptoms pointing toward metastases.

Diagnosis.—Mixed round- and spindle-cell osteosarcoma undergoing rapid growth.

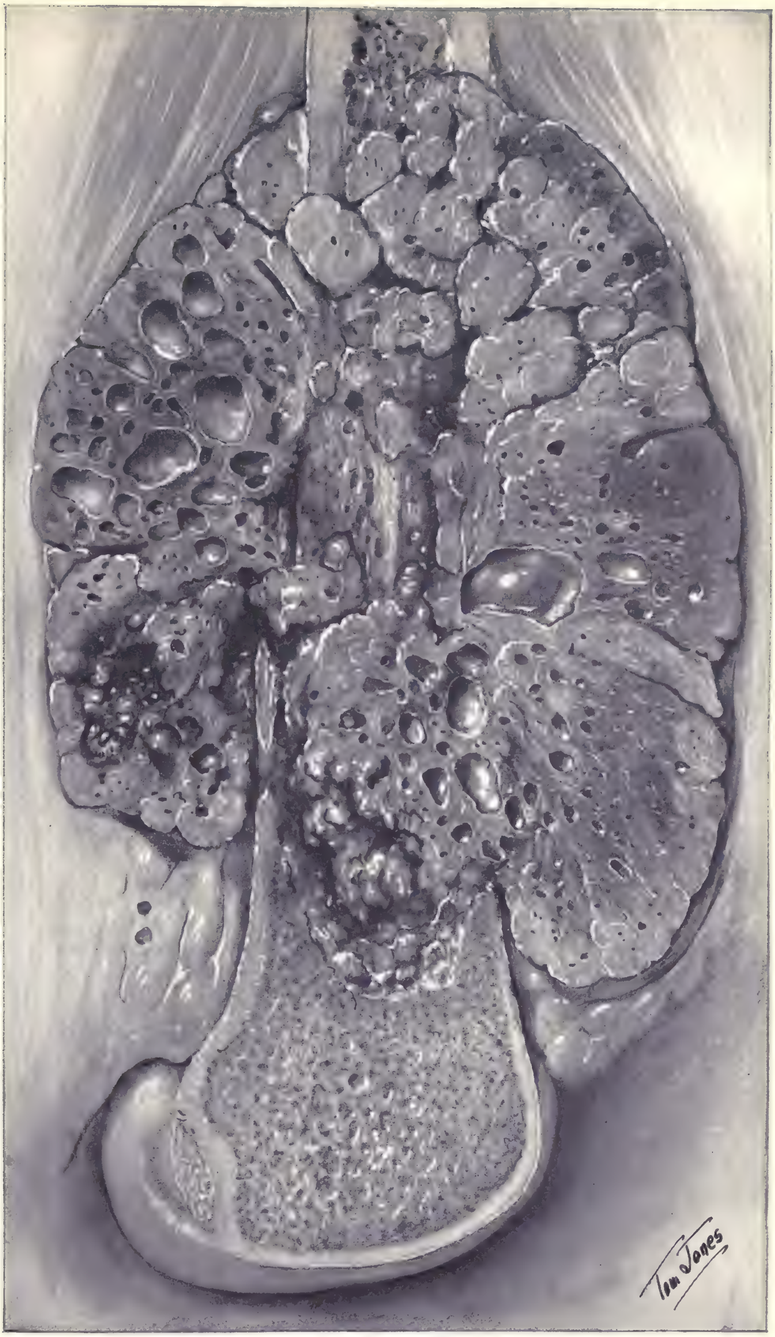


Fig. 215.—Osteosarcoma of femur just above condyles. Tumor is completely encapsulated, and its periphery is composed of lobules varying in diameter from 2 to 4 cm.

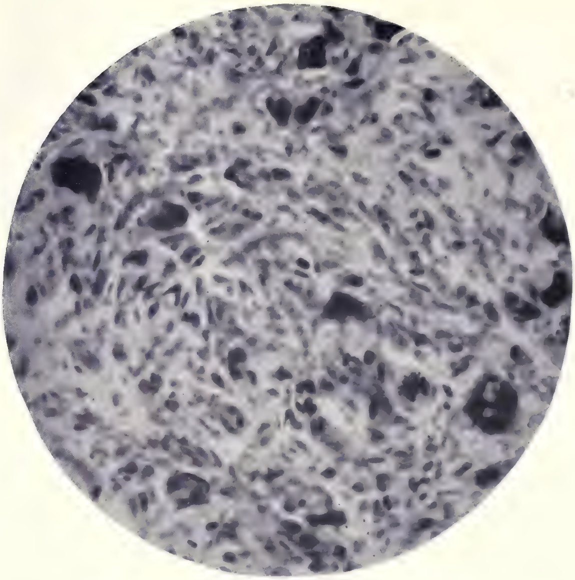


Fig. 216.—Osteosarcoma of femur. Section from center of tumor showing spindle-cells, round-cells, mitotic figures, one gigantic karyomitotic figure, and osteoclasts (× 275).

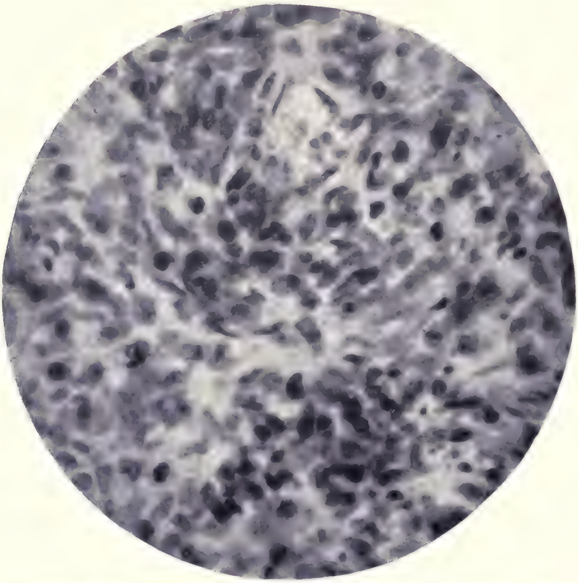


Fig. 217.—Osteosarcoma of femur. Section from tumor showing numerous mitotic figures (× 450).

CASE II.—Patient of Dr. Golden's. The patient, a well-nourished young woman, entered Mercy Hospital June 1, 1916, complaining of a growth in the mouth on the right side of the maxilla, just posterior to the last molar tooth. This trouble began last January, with a slight irritation of the gum, which was caused by a gold crown. She paid no further attention to this condition until recently, when she consulted a dentist, who advised her to seek medical advice. On the day following her admission to the hospital the growth was removed, together with the adjacent periosteum and a portion of the underlying bone.

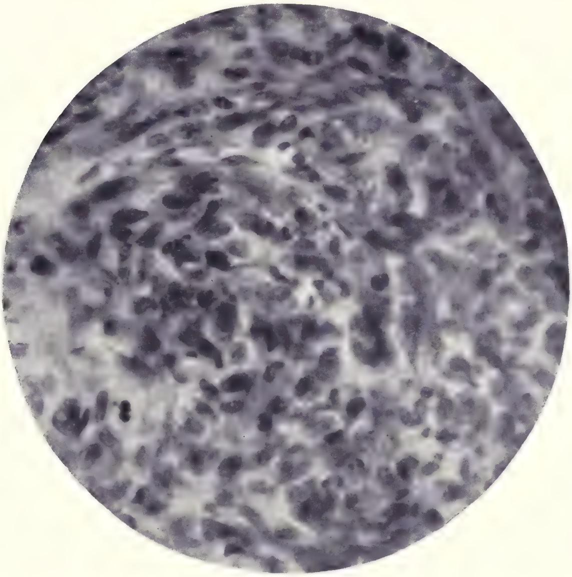


Fig. 218.—Osteosarcoma of femur. Section from tumor showing round-cells, spindle-cells, and mitotic figures (× 450).

Microscopic examination of this growth showed it to be composed of spindle-cells with considerable intercellular tissue. There was no evidence of its being an actively growing tumor, and consequently a good prognosis was given the patient.

Diagnosis.—Epulis.

CASE III.—Patient of Dr. George W. Hochrein's. The patient, a young man aged eighteen, entered Mercy Hospital April 10, 1914, because of a diffuse and rather acute osteomyelitis involving the right mandible, and which at this time was of six weeks' duration. This lesion was freely opened and drained by means of a tube which extended downward and opened midway between the angles of the jaw. A peculiar, granulation-like tissue formed around the tube, which upon examination in the hospital laboratory showed nothing else than the residua of an inflammatory process. This tissue was removed in November, 1914, and at the same time a sequestrum which had formed was removed from the right ramus. In June, 1915, a lesion which had formed on the left thumb was thoroughly curetted, as was also a similar lesion which had appeared on the forehead.

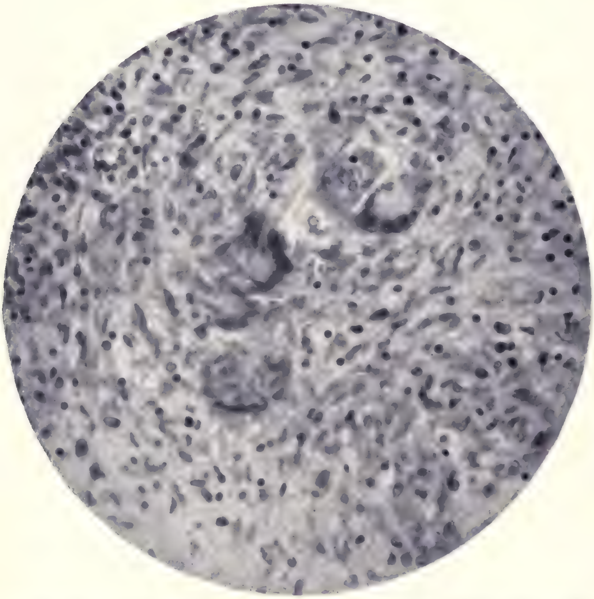


Fig. 219.—Osteosarcoma of finger. Section from finger showing giant-cells (× 325).

Microscopic examination revealed each of these lesions to be a giant-cell sarcoma (Fig. 219), and by the latter part of September each lesion had returned. At this time the thumb was amputated because of the extent of the lesion, and the forehead was recuretted. (The latter lesion gives no evidence of returning.)

On October 26, 1915, a lesion was found on the right astragalus, extending into the bursa of the tendo Achillis. It was removed by dissection, and because the wound looked so clean the actual cautery was not used. The tumor returned, however, and became secondarily infected. On March 6, 1916, a high leg amputation was performed. While recovering from this operation pain developed in the left foot, and upon *x*-ray examination a periosteal lesion of each of the cuneiform bones was found (Fig. 220). These lesions extended very rapidly and involved all the tarsal bones, and on August 1, 1916, a drainage-tube was placed through the foot on account of a rather profuse, serous-like discharge from a sinus which had formed (Fig. 221). The patient would not permit any other operative procedure on the foot at this time, but gave permission to have the left index-finger amputated (see Fig. 222). On August 24, 1916, he permitted the left foot to be removed. The lesion on the finger had been present only one month, and appeared to be an intramedullary affair, as the whole phalanx was enlarged (Fig. 223).

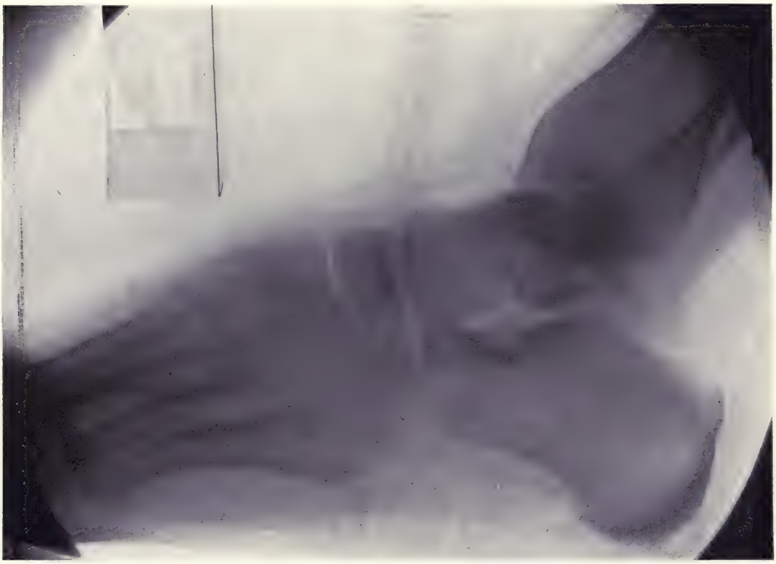


Fig. 220.—Osteosarcoma of astragalus, scaphoid, and of the three cuneiform bones. These lesions contain giant-cells. Another view shows that the metatarsal bones are free from lesions.

On September 7th lesions which had been present on the left elbow since the latter part of April, involving the joint and all the three bones forming it (Figs. 224, 225), were removed by dis-

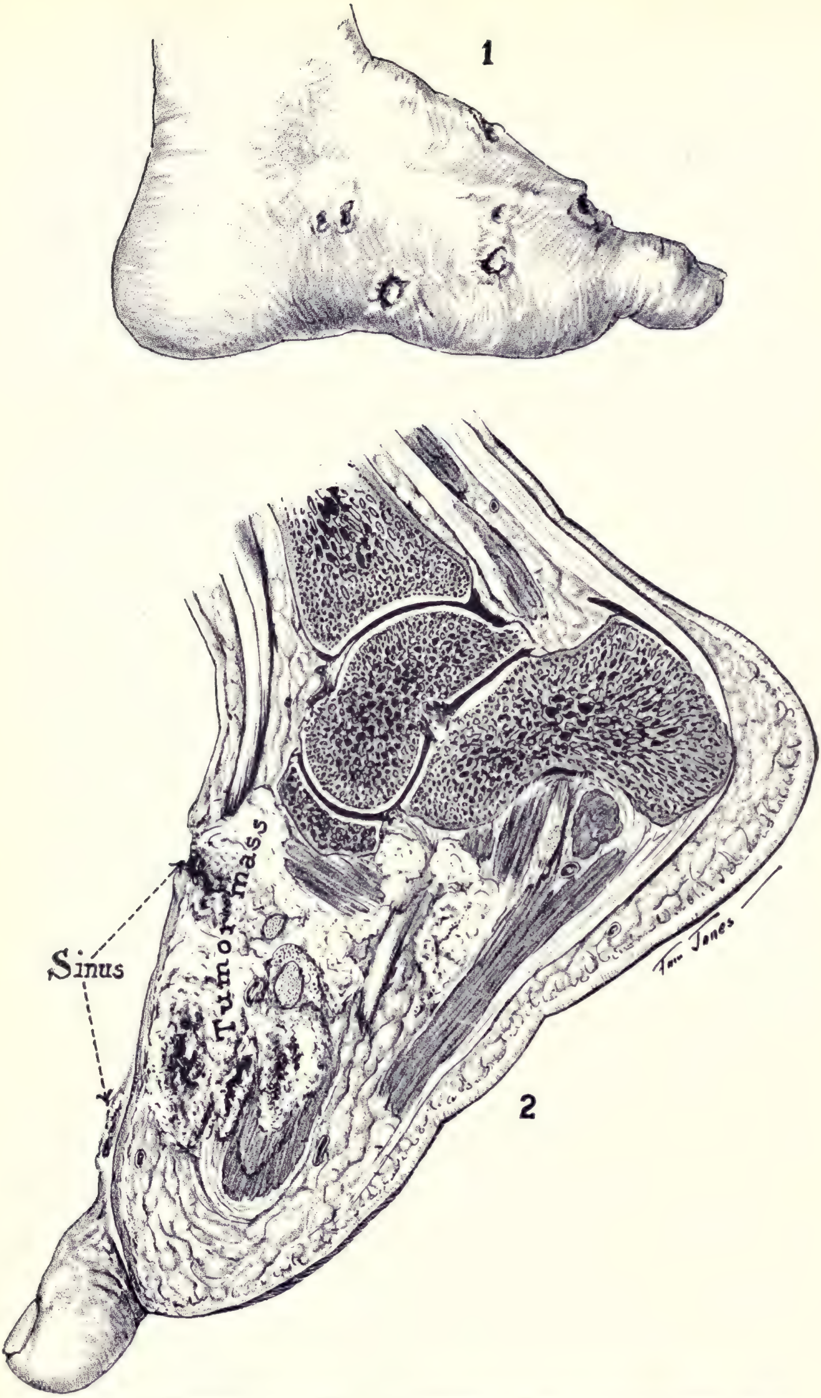


Fig. 221.—Osteosarcoma of foot. *1*, Appearance of foot on physical examination, showing orifices of sinuses. *2*, Appearance of foot on pathologic examination showing extent of tumor mass and degree of destruction caused by it.

section, curettage, and cauterization. These lesions returned rapidly, became secondarily infected, and finally forced the patient to undergo amputation of the arm early in October.

The general condition of this patient has been uniformly good, but has been markedly improved since the amputation of the left foot in August.

All the lesions have shown giant-cells (Fig. 226) and the usual formation of cells and stroma found in myelogenous giant-cell sarcomata, and in addition a perithelial type of growth. A giant-cell tumor was recurring in the stump of the amputated finger and was demonstrated after the removal of the left arm.

Diagnosis.—Multiple myelogenous giant-cell osteosarcoma.

In connection with this case I wish to refer to a paper by F. R. Haussling and H. S. Martland, which appeared in *Annals of Surgery* for April, 1916. They reported two cases of myelogenous giant-cell sarcomata, one of which seems to be similar to the case described above, in that each showed multiple giant-cell tumors. This report, together with the work of Barrie, Bloodgood, and the teachings of Dr. Murphy, have stimulated us in the handling of this case. It no doubt would have been possible to use more conservative operative measures with our patient had he permitted earlier operative treatment with part of the lesions. The ultimate results obtained in this case will be reported at a later date by Dr. Hochrein.

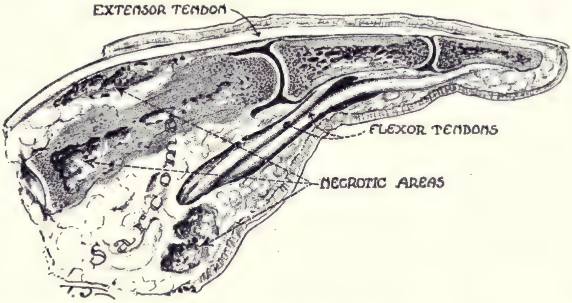


Fig. 222.—Osteosarcoma of finger, proximal phalanx. Note necrotic areas in phalanx from destruction of periosteum and pressure. Note also necrotic areas in tumor itself, which involves chiefly the flexor structures.

Case IV.—Patient of Dr. Murphy's, operated upon by Dr. Golden. The patient, a boy just under seven years of age, entered Mercy Hospital August 12, 1916. He fell and hurt his knee in March of this year while roller-skating. The knee recovered rapidly and but slight attention was paid to this accident, although some pain was constantly present in the hip and has

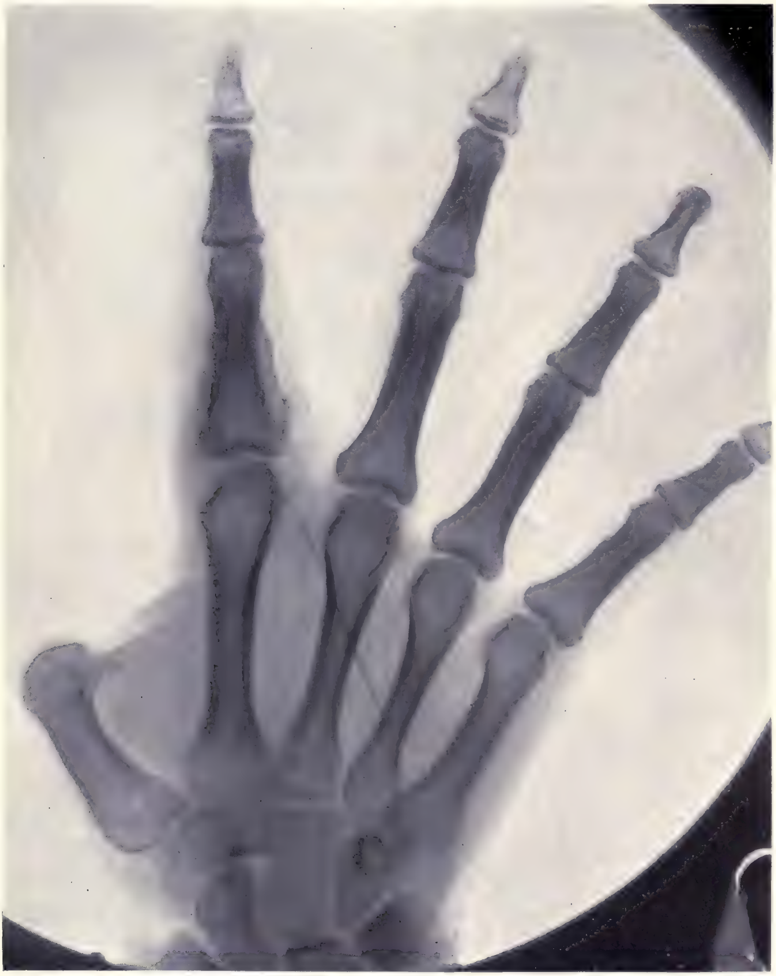


Fig. 223.—Osteosarcoma of index-finger. Nearly the whole proximal phalanx is involved. The distal phalanx of the thumb had been removed ten months previously for the same disease.

persisted up to this time. On June 8th an *x*-ray examination revealed a rarefaction in the upper half of the neck of the left femur (Fig. 227), and on June 17th a gypsum case was applied, but it gave little relief. It remained on, however, until the patient was admitted to hospital. At this time an exploratory incision revealed tissue which, on immediate examination, proved to be a giant-cell osteosarcoma. The tumor mass was thoroughly curetted, and the cavity was cauterized with 5 per cent. phenol. The patient has progressed favorably, the bone is reforming, and there is no evidence of a return of the tumor. The limb was put in a gypsum case and traction was applied (Fig. 228).

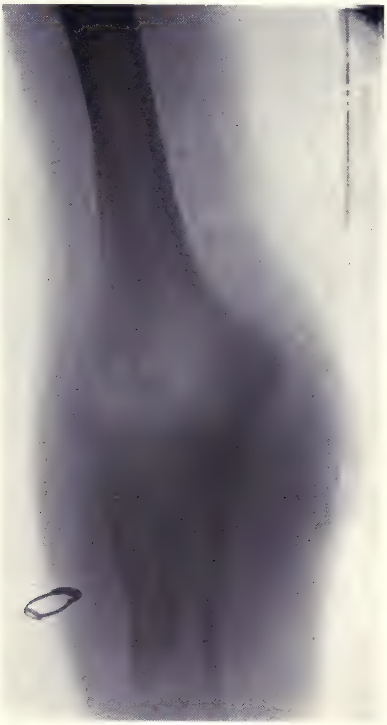


Fig. 224.—Osteosarcoma on internal condyle of left humerus.

Diagnosis.—Myelogenous giant-cell osteosarcoma.

Case V.—Patient of Dr. Golden's. The patient, a young adult Italian, entered Mercy Hospital September 14, 1916. One month ago he suffered a "sprain" of the left arm which was caused by dumping a wheelbarrow of clay. As the accident occurred about 5.30 P. M., the patient soon went home, had supper, and went to bed. On the following morning he had severe pain in the arm, which has gradually grown worse. A skiagram taken just prior to his admission to hospital showed involvement of the middle third of the humerus. There was no evidence of fracture.

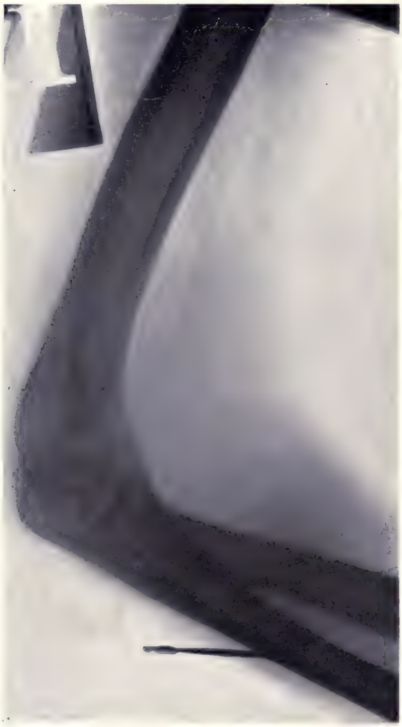


Fig. 225.—Lateral view showing sarcoma of elbow. Upon dissection the greater portion of the tumor was found to be on the anterior surface of the lower end of the humerus. This is shown in the skiagram by the light shadow at this point. The tumor also involved the inner side of the humerus, olecranon process of ulna, and the head of the radius. The posterior aspect of the humerus is free from the tumor.

The tumor mass showed distinctly. Upon the closest questioning the patient said that up to the time of this injury he had never had any pain in this arm; that he had never favored it, and that his health had always been good. There were no evidences of metastases. He has worked as an apprentice plumber for three and one-half years, and during this time carried a bag of tools on the shoulder of the affected side, which custom probably served as a predisposing traumatizing factor.

The tissue removed for examination consisted of a few small pieces, each measuring 2 x 2 x 10 mm. Two of these were quite soft, but the others contained spicules of bone. The soft pieces showed spindle- and round-cells; giant-cells were not found. High amputation was advised, but the patient refused.

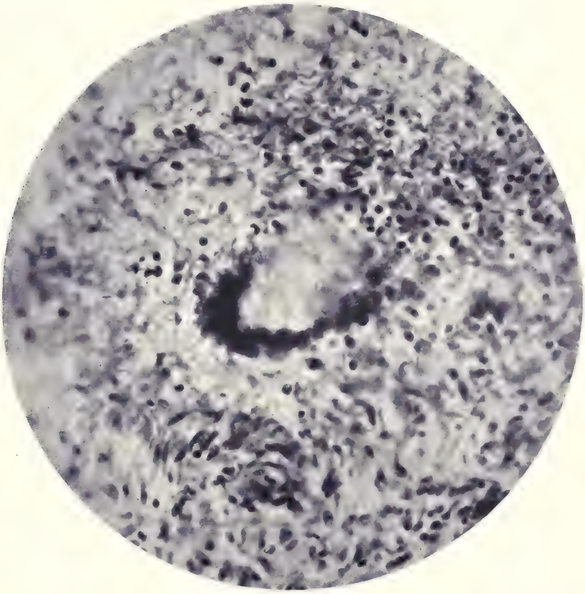


Fig. 226.—Osteosarcoma of thumb. Section from forehead metastasis showing a large giant-cell. Tissue removed at first operation (× 325).

Diagnosis.—Mixed spindle- and round-cell periosteal osteosarcoma.

CASE VI.—Patient of Dr. Hochrein's (see report by Dr. Murphy in August, 1916, CLINICS).

In February, 1911, the patient received an injury to the back by falling into a hole in the floor. He was confined to bed for one week, and because of the pain wore a corset for the following two months. He does not remember any other trauma or strain.

In January, 1914, he complained for the first time of pain in the right lower extremity. Five months later (June) the pain became much worse and radiated to pelvis, and during July he was unable to walk without the aid of a cane. The malady continued to grow worse, and in October a gypsum case was applied, but had to be removed in two hours. Since November, 1914, the patient has been almost helpless. On December 9, 1914, Dr. Murphy removed a specimen through an exploratory laparotomy incision. A large fleshy mass was exposed, extending from the margin of the ilium forward quite close to the skin. Microscopic examination of this tissue showed the tumor to be a mixed round- and spindle-cell sarcoma.

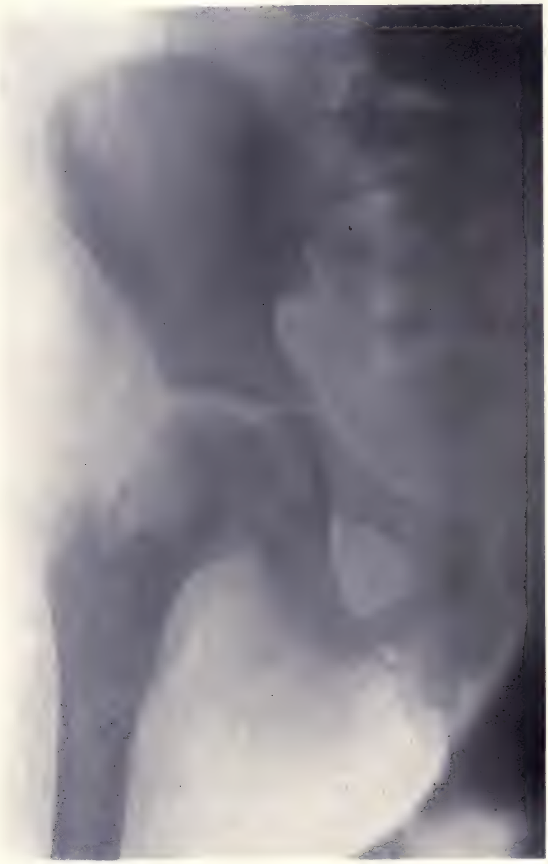


Fig. 227.—Giant-cell osteosarcoma of neck of femur.

On June 15, 1916, eighteen months after the exploratory operation, during which time continuous treatment with sodium cacodylate and Coley's serum had been given, Dr. Murphy made the following observations:

1. That the tumor was about one-third the size it was when the patient first submitted himself for treatment.

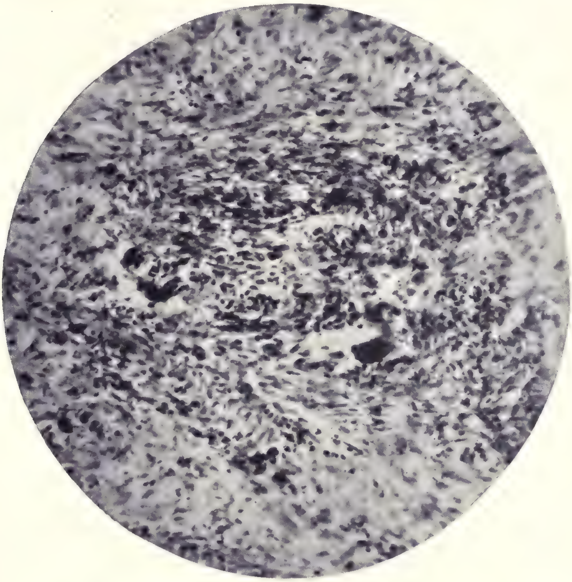


Fig. 228.—Osteosarcoma of neck of femur. Frozen section from curettage showing spindle- and giant-cells. The nuclei of the giant-cells are not as distinct as when first stained (× 100).

2. That it was a striking fact that there were no evidences of metastases.

3. That the general condition of the patient was good.

[The above is a synopsis of the report in the August Clinics, and is inserted here in order to make the clinical picture complete.]

In May, 1916, the patient had a severe attack of erysipelas of the face, which caused a reduction in the size of the tumor. Early in July Coolidge *x*-ray treatments were instituted, and these have apparently caused a still further reduction in size. The patient is feeling better and is much encouraged. He believes that the results obtained are due chiefly to the Coolidge treatments. He can now turn himself in bed with ease, which act had been impossible for a period of six months. Notwithstanding the above favorable condition, an enlarged lymph-node appeared in the opposite inguinal region during July. It was removed by Dr. Hochrein on August 26th, and upon microscopic examination many mitotic figures were found (Fig. 229). The diseased lymph-node measured 4.5 x 2 x 2 cm. It is interesting to note that the above metastasis was not observed until after the original tumor showed signs of recession.

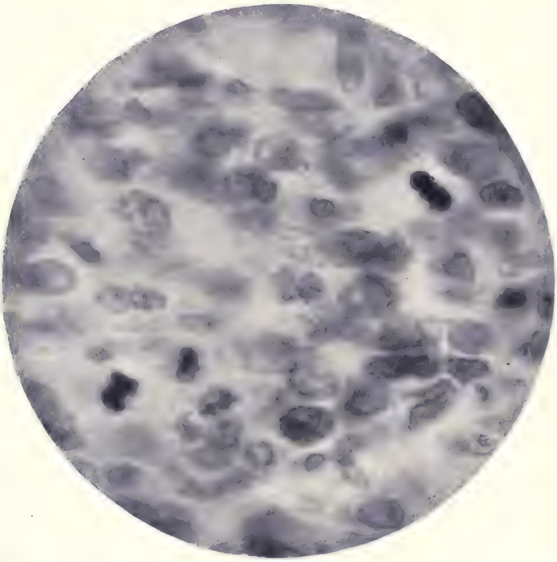


Fig. 229.—Section from enlarged left inguinal lymph-node. Three mitotic figures are shown in the field (× 1200).

Diagnosis.—Spindle- and round-cell osteosarcoma of the ilium with metastasis.

Case VII.—Patient of Dr. Golden's. The patient, a young adult Italian, entered Mercy Hospital July 24, 1916, complaining of pain in the right side. The temperature was normal, expectoration and cough were absent, and percussion and auscultation were negative. The lesions found consisted of a slight swelling of the outer inch of the third right rib, at the junction of the costal cartilage, and a sinus leading down to this rib. The patient stated that the sinus had been present since an exploratory incision was made a few weeks previously. There was no evidence that the tumor had infiltrated the surrounding tissues, or that metastases had taken place. The lesion was distinctly painful when pressure was applied, and seemed to be confined to the above designated rib. Breathing did not cause the patient any special pain, except on deep inspiration. The patient was advised to have the rib resected because of the destructive lesion demonstrated in the skiagram, and because of the importance of making a microscopic study. The following diagnoses were con-

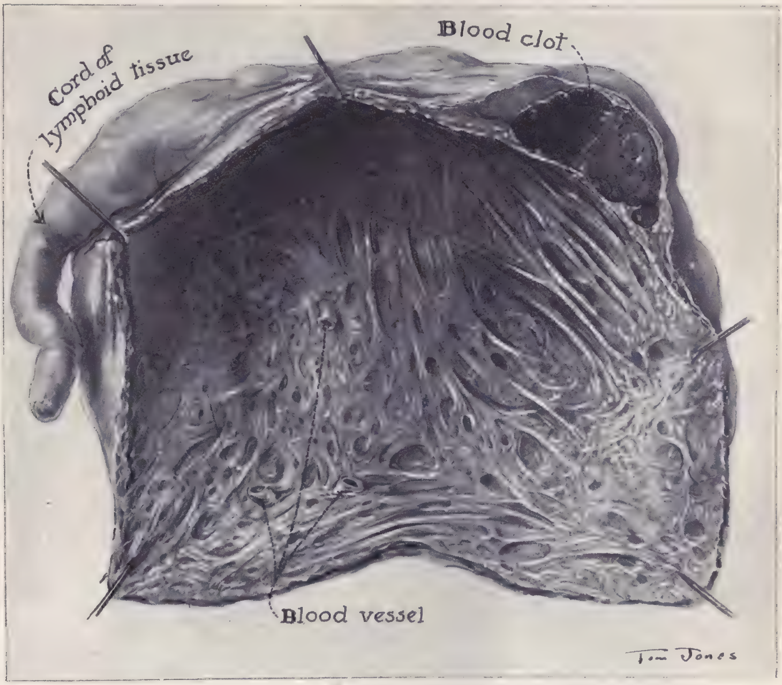


Fig. 230.—Cyst opened. This was a *lymphangioma lymphaticus* of groin, and was about the size of a large orange. It contained a yellowish serous fluid when aspirated the first time. On the second aspiration a reddish fluid was obtained, due to blood. Note the network of trabeculæ which formed the inner wall of the cyst. This resembled very closely the columnæ carneæ of the heart. Examination showed no evidence of malignancy.

sidered: osteomyelitis, syphilis, tuberculosis, and sarcoma. The histologic study of the soft tissue filling the defect in the bone proved it to be a giant-cell osteosarcoma. Spindle-cells predominate in the sections studied, but the giant-cells were, however, definite and characteristic. The patient has no evidence of a metastasis or of a recurrence to date.

Diagnosis.—Myelogenous giant-cell osteosarcoma.

Case VIII.—Patient of Dr. Golden's. A man of middle age, with a tumor in the upper portion of the right tibia, was referred to Dr. Golden for diagnosis. The patient gave a history of having had two curettings of this tumor. The last curettage was brought to us for examination by the patient's physician. This material consisted of about 20 irregular pieces of tissue, which varied in size from 1 to 4 cm. in their greatest dimension. Dr. Golden removed a piece of tissue from the lesion through a sinus which led down to it. Numerous sections from these tissues show that the tumor was composed of spindle-cells with varying

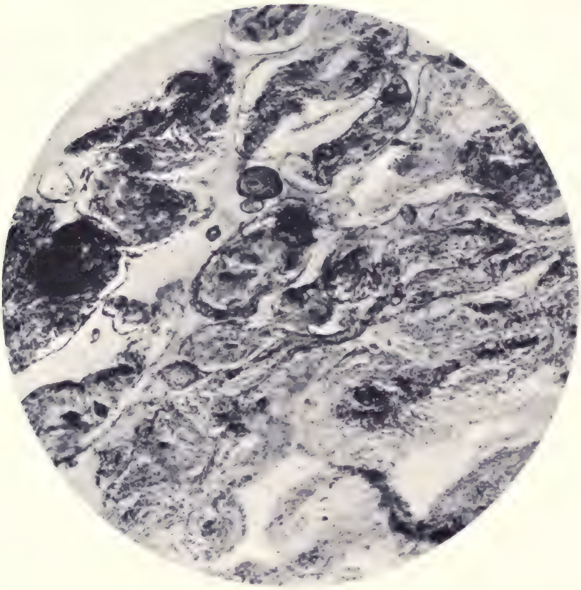


Fig. 231.—Vertical section through inner half of wall of cyst in Fig. 230, showing endothelial lining and trabecular network on the inner wall of the cyst (× 60).

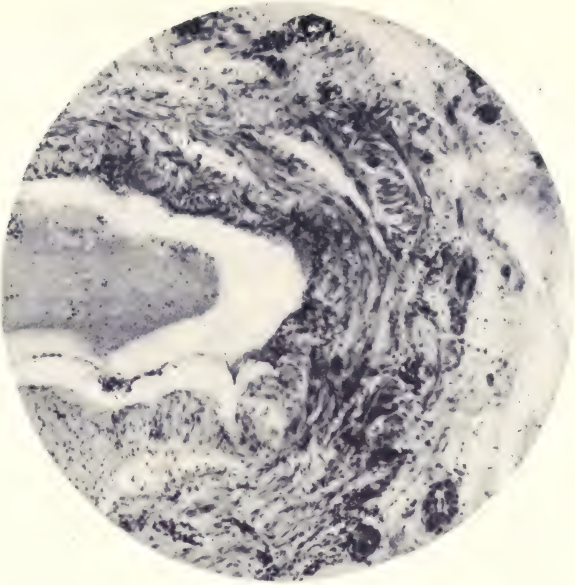


Fig. 232.—Section of wall of cyst in Fig. 230, showing the largest blood-vessel present (× 95).

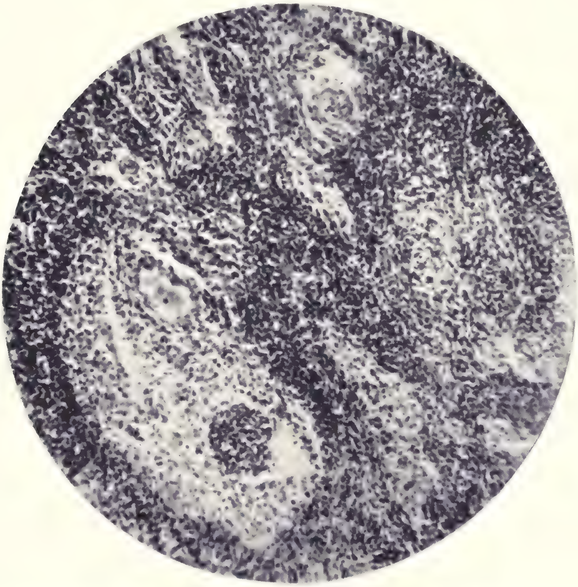


Fig. 233.—Lymphoid tissue from cord of lymphatic tissue shown in Fig. 229 (× 170).

amounts of intracellular substance throughout its extent. Mitotic figures were not found. On one of the pieces of tissue brought by the patient's physician epidermal cells similar to those in the skin were found. This condition was undoubtedly due to implantation or extension of cells from the skin. Coley has reported a similar condition occurring in a sarcoma of the femur, the pathologic examination having been made by Dr. W. H. Welch (*Annals of Surgery*, vol. lviii, 1913, p. 97).

The patient was in good health and had no evidence of metastases. He was advised to have a high amputation, but refused.

Diagnosis.—Spindle-cell osteosarcoma.

It is hoped that the above report, which includes 15 cases of osteosarcoma, will stimulate interest in the early study of all symptoms suggesting bone disease, and that the following scheme may be found of value in the handling of these cases:

1. Complete history covering the following points:
    - *a.* Trauma or strain, time of occurrence, and whether of repeated or of single occurrence.
    - *b.* Pain, time of occurrence, duration, and character.
    - *c.* Tumor or swelling.
    - *d.* Cough.
    - *e.* Expectoration.
    - *f.* Night-sweats.
    - *g.* Fever (with special reference to tuberculous and infective osteomyelitis).
    - *h.* Evidences of primary carcinoma or sarcoma in other portions of body.
    - *i.* Evidence or history of syphilis.
    - *j.* Evidence or history of osteomyelitis.
2. Wassermann test.
3. Skiagrams.
4. Exploratory operation when diagnosis is not definite.
    - *a.* Gross examination of tissue.
    - *b.* Microscopic examination of tissue.
5. The above step should be immediately followed by the indicated surgical treatment.
6. In certain cases of sarcoma sodium cacodylate and Coley's serum are undoubtedly of value.

7. *X*-rays, given by Coolidge tube, should be used in certain cases.
8. Order of malignancy, beginning with most malignant.
    - *a.* Round-cells.
    - *b.* Large spindle-cells.
    - *c.* Small spindle-cells.
    - *d.* Giant-cells.

The varying degrees of malignancy of sarcomata of bone have not yet become definitely established, although the above order is, on the whole, thought to be correct. It is generally agreed that their malignancy depends directly upon the amount of intercellular tissue, malignancy increasing as the intercellular substance decreases. The consensus of opinion is that the so-called myelogenous giant-cell sarcomata do not form metastases, but that they may recur at their original sites. Barrie, Bloodgood, and others are of this opinion, but in view of Case III above, and of the case reported by Haussling and Martland, further work must be done before this view can be accepted as established.

ANCIENT INJURY TO SKULL WITH FOCAL SIGNS—DECOMPRESSION

CLINICAL HISTORY OF PATIENT

The patient, a girl of seven years, was admitted to Mercy Hospital September 7, 1915.

Her family history is negative. She had smallpox at the age of ten months. Otherwise her past history is negative.

She was born by forceps delivery, and for the first five months she was apparently in good health. At the age of five months she fell forward from the seat of a rocking-chair to the floor, her head striking the leg of a table and then the floor. She fell head foremost, and it is believed by the position in which the child was found that the left side of the head struck first, although there were no abrasions of the scalp and no swelling or redness to indicate where the child might be hurt. From the fact that she did not cry much after the fall the mother presumed that she was not injured and paid no further attention to it.

In about twenty-four hours after the accident the mother noticed the child going into a spasm. It was the first she had noticed of anything being wrong with her. The spasms, clonic in type, lasted only a few seconds, but occurred about 25 times a day for the following ten days. In two weeks she had another period of spasms lasting about eight days. Ever since she has had periods of spasms lasting twenty-four hours and recurring at intervals of three to thirteen weeks apart, with the exception of the last one. Eight weeks ago she had a period lasting only eight hours. During the period of twenty-four hours she would have eight or ten spasms. The first of these would be mild, consisting only of a slight tremor, the second and third more severe, and so on until about the third from the last would be the most severe, consisting of a sudden jerk, short and deep inspirations, contraction and rigidity of the right leg and right arm, head dorsiflexed and turned toward right shoulder, left arm and leg relaxed, jaw closed, eyes rolling upward, but no frothing from mouth. The spasm would last for four or five seconds, then a complete relaxation would occur. She would be conscious of her surroundings, lie face downward, and try to rest. The next two or three spasms, which would follow in a few hours, would recede in severity until the last, which would be but a slight tremor for a few seconds. Another period of spasm would follow in from three to thirteen weeks. She has bitten her tongue during the spasms, but never injured herself otherwise. The mother has always used a wedge between her child's teeth. The spasms come on suddenly, when least expected, and without warning, although her mother has noticed that if the child jumps from her sleep as though frightened the spasms will commence the following night. Following the last spasm, about eight weeks ago, the child lost partial control of the right arm and leg. She does not become blue in the spasm, but rather pale, and sometimes following the spasm has a slight fever. She does not cry either before or after the spasm.

She has always had pain in the head. It becomes very severe about once a day, and lasts from one to five minutes, seemingly located in the frontal or left temporal region. During the pain the child has pulled the hair out of her head, and often strikes the left side of the head against the wall and then stops as though to see if the pain has disappeared. If not, she strikes it until it is gone. She likes to have left side of head patted all the time.

She does not speak as well as she used to. She seems to have an increasing aphasia. She has advanced intellectually in every other way, and is very clean and orderly about her person, although very nervous.

Examination by Dr. Murphy (September 4, 1915).—The left side of the head is not so well developed as the right. The right frontal region is a considerable degree higher; in fact, all the right side of the head is larger than the left. It is more marked in the biparietal diameter, and there is a difference of at least one-half an inch. The fact that she is having trouble in her limbs is a favorable sign. The x-ray plates show an increased intracranial pressure very marked. She was examined by Dr. Mix and an operation was advised.

Examination of the urine was negative.

COMMENTS

Dr. Murphy (September 9, 1915): When the child feels the spells coming on, or when she feels particularly nervous, she will strike the left side of her head against the wall, or if she is near her father or mother she will run to them and ask them to strike her on the left side of the head. That seems to take the tension off or the irritation off temporarily. In the etiology of this case one has to estimate two pictures: first, that a forceps delivery was necessary in order to get the head to deliver. It was a high forceps delivery, which has to be taken into consideration as a possible etiologic factor. The second was that the child fell out of an ordinary rocking-chair, striking on her head. The first time she had any manifestation of any trouble was within twenty-four hours after that accident. The questions that arise are, did she at that time have a subdural hemorrhage or did she have a middle meningeal hemorrhage, and was it that which produced the irritation that finally caused her to have a convulsion within twenty-four hours, which is not at all uncommon, or did she have a convulsion which threw her out of the rocking-chair and were the convulsions the sequence of the forceps delivery or were the convulsions the sequence of a hematoma? Now, then, she has been to a number of specialists, and it was decided that nothing could be done. The reason that nothing could be done was because it was only recently that she had the focal symptoms. Her speech is interfered with and is becoming more so. The motion in the right side is becoming decidedly interfered with. Now she has a large bulging in the right side, and she has a paresis of the right arm. These are the first focal symptoms she has had. When you take into consideration that her speech is interfered with, and the motor center is involved on the right side, it means that she probably has a lesion on the left side, and the lesion that one should expect on the left side would be a cyst and not a neoplasm. You know further that occasionally a blood-clot becomes encapsulated. Now, then, her greatest motor disturbance is in the arm and not in the leg, which brings the lesion lower down. If you will just take the motor center and run down the Rolandic zone, begin with the toe and run right up the leg into the trunk, then start with the shoulder and run down from the shoulder to the tips of the fingers, and then start with the upper part of the face, the eyelid, and run down to the lower part of the face: that is, the arrangement of the motor tract. In his cortical motor centers a man is standing on his head. That is all you have to remember in a general way.

OPERATION

Let the record show that, for a child of her size, the skull is exceptionally hard.

Now, look! I endeavor to blaze the way in which we wish this bone to fracture. There is the end of my incision, and there is the way I want this to break—in a definite direction. I am freeing the dura from its attachment to this. It is difficult to work because this is young bone.

Let the record show that there is no pulsation of the dura; that the dura is cicatricial.

It will save quite a little bleeding to put this needle through now, stopping these vessels at the first. That stops much of the oozing. You can see the vascularity of that brain. I never saw a brain as vascular as that before. The needle strikes nothing in the way of resistance like the sac of a cyst. There is the Rolandic line. No resistance as you get near the center, but the physical findings show positively that there is an obstruction above, otherwise this vascularization would not be present. We shall remove the dura and excise the scar. In children most of this bleeding stops with ligation. We are doing a decompression and not an interposing flap of fascia and fat, as we sometimes do. If you will remember, in the last case we had here after we removed the dura we put in a portion of fascia lata. Here we want to permit of a little more decompression than usual, and we are putting nothing inside. I am putting the periosteum back so as to cover the margin of that and to cover over that gap. She has not had any convulsion up to this time during the operation, which is rather exceptional. Many of these patients have convulsions during the operation. What effect this has I do not know. When one of these cases recovers, it is like an oasis in the desert. You have, if you average up your operations for lesions of this type, about one in twenty getting well. About five in twenty are very materially relieved, and the remainder are not benefited at all. That is all right from the patient's standpoint. If I were the patient, of course I should want that chance. It is mighty unsatisfactory from the surgeon's standpoint. At the same time we have no right to deny these patients the opportunity to get relief from the lesion. There is no hazard or chance that we are not justified in taking, because death is so much better than insanity. Of all the calamities that befall a human being, there is nothing worse than insanity. After that drink; and after that, debt. I now see occasionally a young girl whom I operated upon for a condition not quite similar to this. She was relieved of the severity of the attacks shortly after the operation. They commenced to return again with increased severity, but never back to the original degree of severity. She has gotten perfectly well, and that is almost twelve or fourteen years ago. Now she is a very stunning young woman, without any evidence at all mentally or otherwise that she ever had a lesion. Still you can see when you have a few cases of that kind, even though it is only an oasis in the desert of disappointment, it still shows that the work is worth keeping up.

Let the record show that on elevating the cranium there was no pulsation and there was an immediate bulging of the dura; as soon as the dura was divided in a moon shape there was a vaulting forward of the cortex, showing the venous stasis and the enormous dilatation of the vessels, indicating that there were some pressure down at the base and some interference with the return of the venous circulation.

Now just what that is I do not know. I have not the slightest idea that there is any spot in that portion of the brain that is affected from a motor standpoint and from a speech standpoint. You see we made these punctures, and in making the punctures, when you come to a cyst-wall, you immediately recognize it by the resistance. The eye on that needle is on the side, and not in the center, so that you can tell when you come to a cyst-wall. You finally feel it come through, and then you take out your needle and out comes the fluid. If you merely use an ordinary needle with an open end, it fills with brain and you do not know what you are in.

Now, then, we have given this whole brain an opportunity to expand. The percentage of cases in which you need to enlarge the cranium in order to relieve the intracranial pressure is very small. Remember, it is an inelastic wall, and if you just take out the wall, as we did there, it gives you an enormous relief of the pressure within, entirely different from what it would be if you had an elastic wall. That is why decompressions in the brain and in the spinal cord have been so very successful in the non-malignant type of lesions. From the appearance of the dura in this case it looks as though the trouble had been an extradural one rather than an intradural. There were no adhesions to the dura.

HARELIP—CHILOPLASTY

CLINICAL HISTORY OF PATIENT

The patient, an eight-months-old boy, was brought to Mercy Hospital November 9, 1915.

The family history is negative. The patient is the younger of two children of healthy parents. He is a breast-fed baby, and has always been well.

He was born with a cleft in the upper lip, to the left of the median line. The palate is not cleft. He has had no operations.

Examination by Dr. Murphy (November 3, 1915).—The cleft involves the lip, but not the palate.

COMMENTS

Dr. Murphy (November 9, 1915): This is just a harelip, not involving the palate at all, but passing just straight across the lip. There is a little retraction of the nostril, so it will be essential in doing the work that we reëstablish the proper relationship of the nostril. That is one of the disfiguring things in connection with a harelip operation, that the nostril is permitted to remain spread out and then becomes flattened down as the patient grows older.

OPERATION

Now, you see what I am trying to do, and what I have succeeded in doing, is to build up the nose with my deep stitches, so that the lip is thicker than the normal lip.

Let the record show that we split the lip and detached the ligament so as to bring the central septum of the nose up into position and to remove the traction from the nasal attachments, so as to get the full thickness of the lip at the point of division; and that the mucous membrane was detached and freed in the regular way.

Postscript.—The stitches were removed on November 16, 1915. The parents were told to bring the boy back in a year and a half.

ANGIOMA OF LIP—ABLATION

CLINICAL HISTORY OF PATIENT

THE patient, a boy aged six years, was admitted to Mercy Hospital June 2, 1915.

The family history is negative. The patient has had whooping-cough, chicken-pox, mumps, and measles.

When the patient was about three months old his mother noticed a small blue discoloration on the upper lip, which was slightly elevated. This gradually increased in size and at the age of two years was operated upon. It rapidly recurred, and he came to Dr. Murphy for operation one year later (May 23, 1912). A tumor probably larger than the present one was removed from the left side of the upper lip. Healing took place *per primam*. Two months later a small discoloration was noticed, which slowly increased in size up to about three months ago, when its growth seems to have become more rapid. The mother says that it is larger some days than others.

Examination by Dr. Murphy (June 1, 1915).—The tumor began away down in the margin, and involves very much of the left half of the lip. It goes clear through the lip in the middle and goes over to the veins on the right side. It is close to the skin on the right side and there is danger of necrosis.

COMMENTS

DR. MURPHY (June 3, 1915): Let the record show that the mother was distinctly instructed the first time to come back the moment a similar tumor began to show.

This is a typical venous telangiectasis, involving the whole thickness of the lip, and coming clear from the margin out to the skin. It shows as a black tumor through the skin. In the original operation we dissected it from beneath and husbanded the skin, notwithstanding it was shining through. Now he comes in again with a tumor about as large as the original one, pulling up the lip. What is the prognosis? The prognosis is unfavorable. The prognosis is unfavorable to our ever being able to stop that from enlarging. Why do I say that? Just because I first saw one of these when I was ten years of age. A neighbor's child had one of these on the margin of the orbit. He was operated and reoperated upon and finally the tumor caused pressure upon the brain and the patient died. That was my entrance into this line of work. From that time I have seen a large number. The fatal type is more common on the margin of the orbit, on the ends of the fingers, or in the neighborhood of the wrist. The patient has a congenital telangiectasis or a dilatation of the veins. It slowly increases in size. You dissect it out, and no matter what you do it keeps going up and up until finally it gets into the mediastinum and you have a fatal termination. You see they start and come up. They come right up the hand and you amputate that. Then they come in the arm or forearm, and you amputate that, and they return again higher up, until finally they are in the mediastinum and you have a fatal termination. That occurs in a large percentage of the cases. There is another percentage in which, if you dissect them out once or twice or three times, you finally obtain a mastery of the situation, but they are always annoying to treat and always dangerous.

You will see this is a little thing on the upper lip. You will see that it is mighty serious for a man to take out such a little thing. We shall do this operation a second time, and we shall give the same instructions, and I presume they will be followed with the same neglect as the first ones, because that is the rule.

In a patient we had from Iowa we made an extensive dissection of the upper arm for a pathologic process in the wall of the vessels, the true nature of which has never been worked out by the pathologist. When you cut the vein it appears to be larger than normal and thicker than normal. You know that is true of varicosities of the leg. Where you have varicose veins of the leg, on taking out the vein you will find that the wall is thicker than a normal vein. That is not to be wondered at, because, as the vein dilates, you have what? An enormous increase in the area of the surface on which your pressure is exerted. Remember you have to multiply the square of the surface to get the relative double pressure. See what a difference that makes!

I should like to have sent him to Dr. George A. Wyeth, of New York, to have it boiled out, but it is too near the skin and you cannot escape the skin. I have sent many of these to Dr. Wyeth for applying hot water, because he has had the greatest experience of any one in this line. We usually see them where they involved some portion of the face, and where you wish to avoid deformity and where you do not wish to deform the face. We have another case of this kind in hospital—a much more serious case, as far as the patient's life is concerned.

OPERATION

Now you see he is straining with the emesis, and you can see how the lip sticks out. It does not stick out like that ordinarily. When you take hold of it that feels first like a solid tumor. You can see the enormous thickness of that lip under tension. . . . Now I have the angioma with the blood practically all in it, so that I have it under tension and thus under favorable conditions for incision. I am going to take out a large portion of the muscle. That muscle is dilated by the pressure. You know when they are on the leg and you take hold of them it feels as though you had a skeleton covered with skin. Everything else is absorbed. The same condition occurs here.

I am taking out some of the scar tissue that remains from the previous operation so as to permit that lip to come around. In a moment I shall show you the tumor in the mucosa. You have a similar class of tumors—the lymphangiomata—that occur in the face. They are about as annoying, but not as fatal. They have to be removed. They have a great danger from an infection standpoint. They are closely allied to the angiomata. An angioma when infected always presents a very serious situation. You do not see many of these that become infected now. At the time when we were injecting these angiomata with tincture of iron and injecting them with tincture of iodin they not infrequently became infected and the patient died. The patient always became intensely ill; the temperature would go to 105°, 106°, 107° F., and the patient died. They occur usually about the neck of children.

These muscles are fairly well developed; they will stretch and stretch. If you get the muscularis under it, the muscularis will stretch and the skin will contract, and in that way we will be able to get a fairly good lip.

Postscript.—The wound healed nicely. The patient was kept under observation until July 1st and then permitted to go home. He returned for examination September 20, 1915. It was deemed advisable to take out a little more from the inside.

SECOND ADMISSION

DR. MURPHY (September 21, 1915): What is the matter with him?

INTERN: Probably a recurrence.

DR. MURPHY: The mother told us that. What is the matter with the boy?

INTERN: Probably a hemangioma.

DR. MURPHY: What is the difference between a hemangioma and an angioma? You divide these tumors into four distinct classes: First, a dilatation of the lymphatics—a lymphangioma; secondly, a dilatation of a vein—a venous angioma; thirdly, a dilatation of the artery—a true angioma; fourthly, a dilatation of both veins and arteries. If you analyze them, you will find they are of congenital origin. When it is a lymphangioma, you have developed a firm, hard resistance. Did you ever see one of these develop in the face and grow with each succeeding year and each time you take it out you get a return of the growth? I remember one that occurred when I was an intern in the Cook County Hospital and how his face grew and grew. Then you have the type that comes as a subcavernous angioma. It may begin in the hand, and you will have it coming along, enlarging in the hand and on up the arm. You operate and you tie this vein and you tie that vein, and finally the case comes to you and it feels like a skin-covered bony mass and all the other tissues gone except the tendons. It goes up the forearm into the arm, and finally into the mediastinum, and terminates fatally. It terminates fatally even if amputation is performed. The patient never consents to an operation at first. I remember a case in my service with Dr. Lee which involved all the scalp on both sides for which a double ligation of the external carotid was done, and then finally a double ligation of the internal carotid; then sepsis and death. I merely cite these as examples of what does occur with these cases.

This child shows practically nothing on the outside. We have not disfigured his lip in either of these operations. This time we are going to cut on the inside, take out a portion of the lip externally, and adjust the skin. This is the third time it has been operated upon. You see the thickness of that lip. There is the angioma. Look! see that fill! As I press it it disappears. That is how I make the diagnosis. See that angioma refill!

SECOND OPERATION

That comes right out to the skin and involves the derma proper. You recognize this. You see the peculiar color of it. You notice the peculiar fibrous character of it. There is the vascular zone. That is very firm tissue, and I am trying not to break my needle in it. You want to catch that just right, so as to bring the muscularis beneath in good apposition, and not to give too great an indentation in the skin. If you do, it will disfigure his upper lip, which is undesirable.

Let the record show that I exposed this venous angioma through an incision in the skin; that we dissected out the tissue to the margin of the normal looking tissue; and that we then did a subcutaneous approximation of all the structures.

You see I have not taken out any skin at all. That will flatten out again and stretch so there will be no perceptible line. He is a boy, and it will be covered later with his mustache, but we hope not to have it scarred sufficiently to have it recognizable after this operation is done. I made this incision for the purpose of freeing the fixation at the septum. No other tissue in the body would stand that amount of contacting with infected material. These tissues around the mouth stand it very well without infection. We do not put on any dressing: we just dress it with a dry powder.

Postscript.—A hematoma formed, which was aspirated on September 29th. The wound healed nicely, and the patient was permitted to go home on October 15th. There is no further report to date (June 29, 1916).

Pathologic Report on Tissue from First Operation (*June 3d*).—Dilated lymph- and blood-vessels embedded in a fibrous matrix. Non-malignant.

A SERIES OF UNCLASSIFIED ILLUSTRATIONS SHOWING CERTAIN PHASES OF DR. MURPHY'S WORK

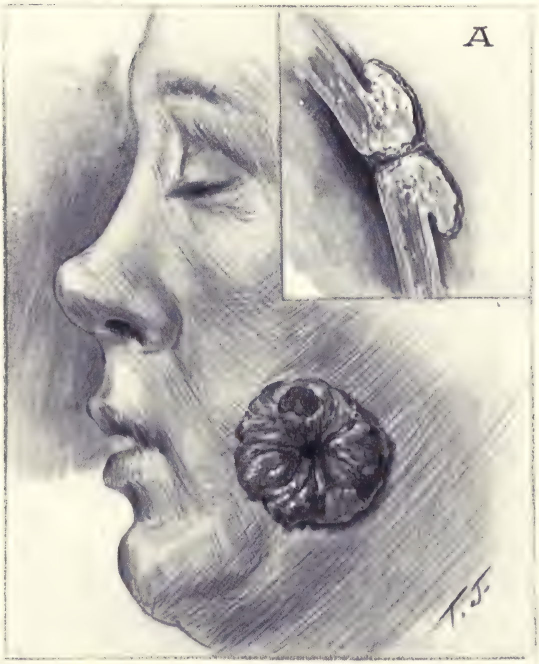


Fig. 234.—Case of fungating carcinoma of cheek. Insert *A* shows buccal salivary fistula in cross-section.

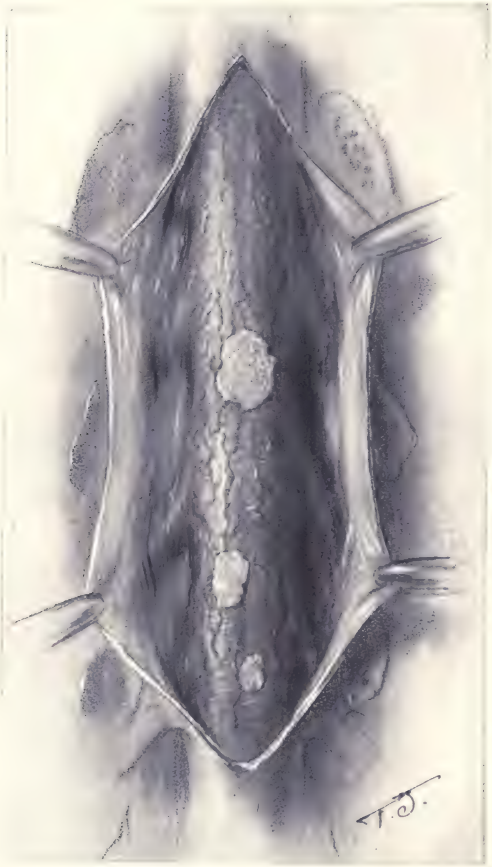


Fig. 235.—Appearance of cord when dura was opened. Note the osseous plaques in the pia pressing on cord at the point of localization as indicated by history. (Case of Dr. Golden's.)

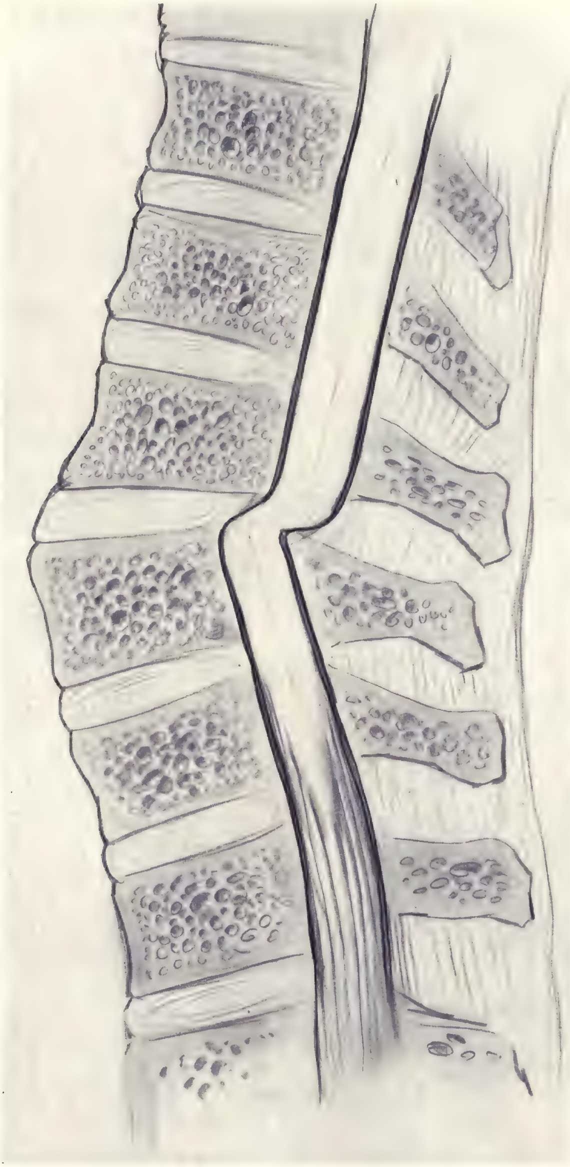


Fig. 236.—Angulation of cord with compression due to fracture-luxation in lower thoracic region.

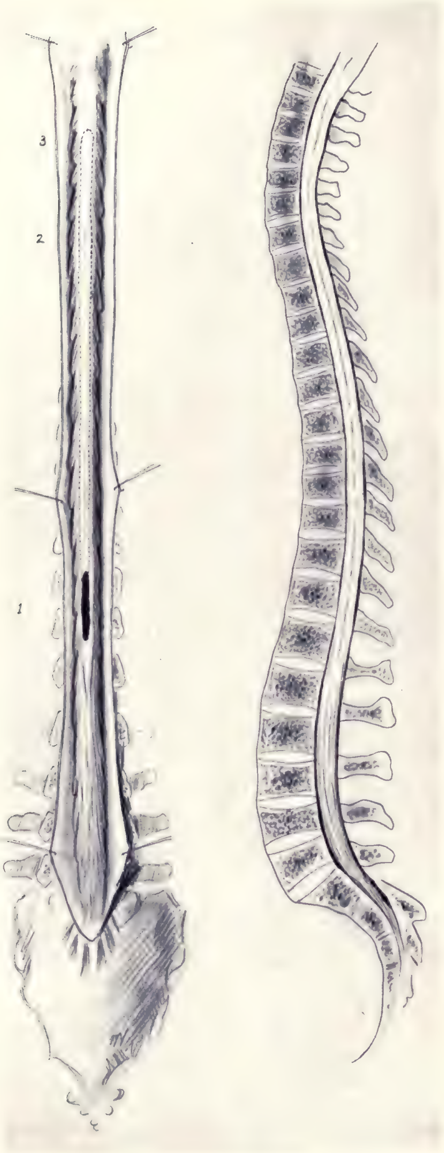


Fig. 237.—Infections of spinal cord. Spinal medullary abscess of pyogenic origin at *1*, *2* and *3* show points to which abscess may extend above.

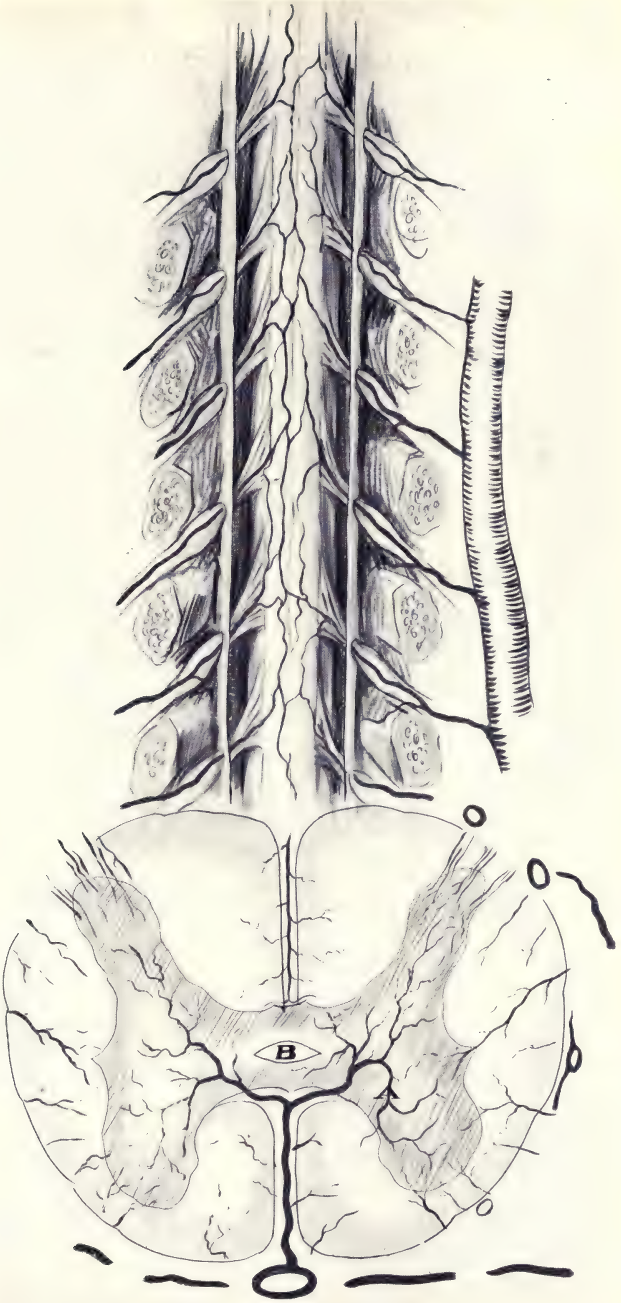


Fig. 238.—Infections of spinal cord: *A*, Point of infection in anterior poliomyelitis; *B*, point of metastatic infection and abscess formation. Upper figure shows blood-supply of cord and surrounding structures.

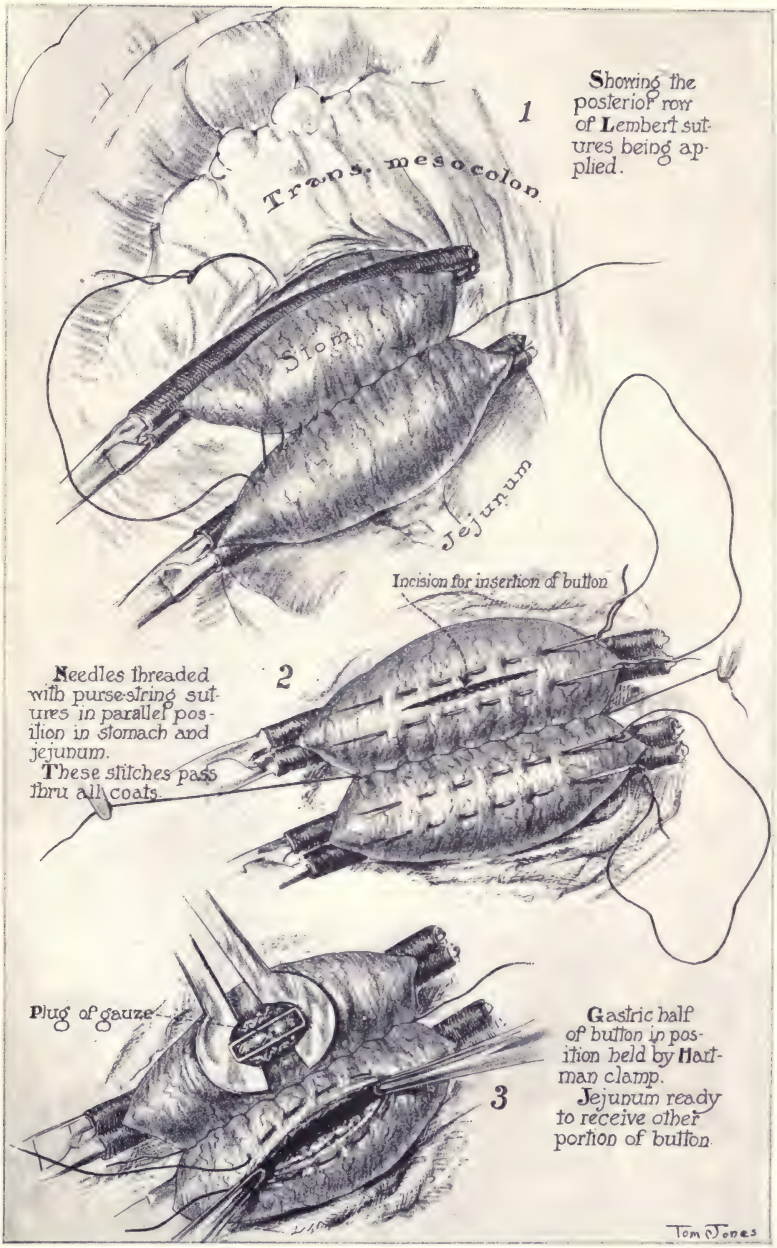
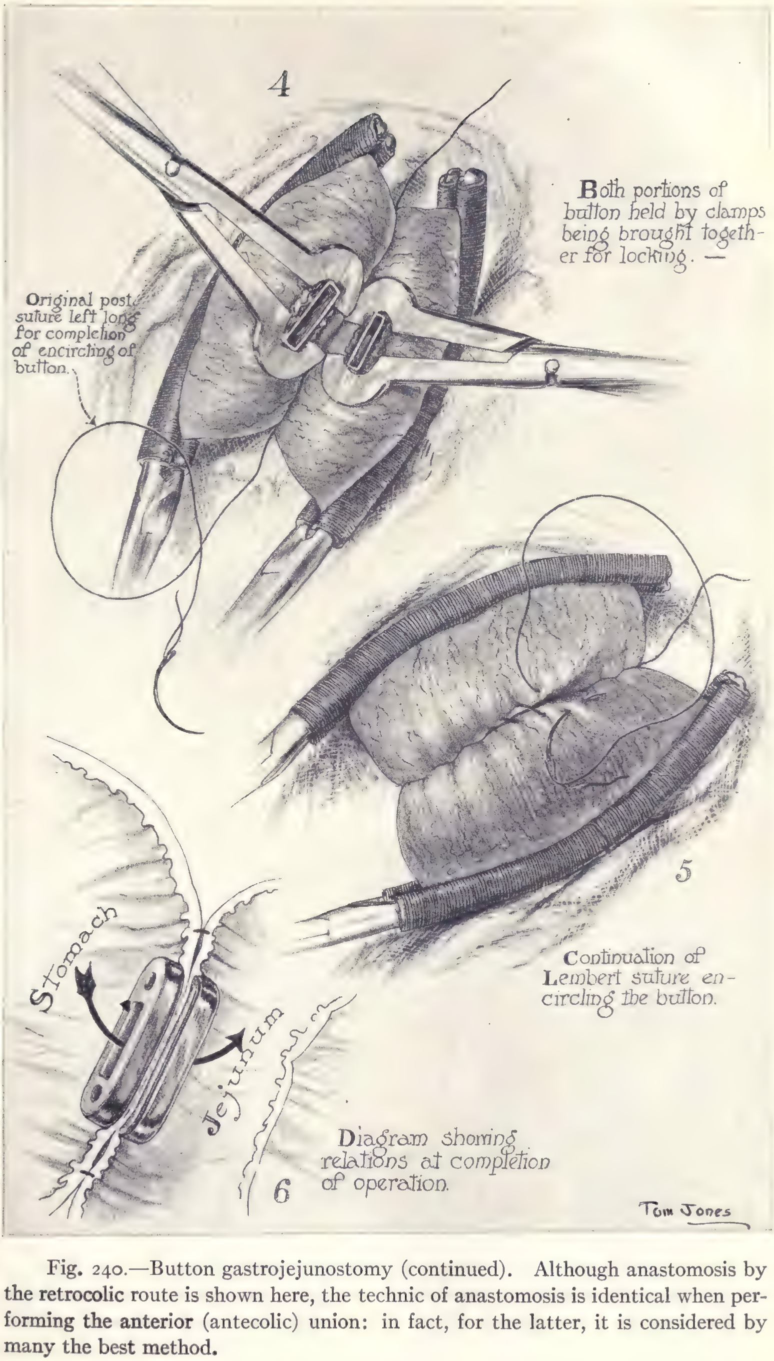

1
Showing the posterior row of Lembert sutures being applied.
Trans. mesocolon.
Stom.
Jejunum
Incision for insertion of button
2
Needles threaded with purse-string sutures in parallel position in stomach and jejunum.
These stitches pass thru all coats.
Plug of gauze
Gastric half of button in position held by Hartman clamp.
Jejunum ready to receive other portion of button.
3
Tom Jones

Fig. 239.—Series of sketches showing technic of gastrojejunostomy by Dr. Murphy's oblong button method.



4
Both portions of button held by clamps being brought together for locking. —
Original post. suture left long for completion of encircling of button.
5
Continuation of Lembert suture encircling the button.
Stomach
Jejunum
6
Diagram showing relations at completion of operation.
Tom Jones

Fig. 240.—Button gastrojejunostomy (continued). Although anastomosis by the retrocolic route is shown here, the technic of anastomosis is identical when performing the anterior (antecolic) union: in fact, for the latter, it is considered by many the best method.

["The greatest stress should be laid on the differential diagnosis between intra- and subperitoneal infections, and in addition the fact should be forced on the profession that subperitoneal cellulitis is not in the range of operative treatment, and that the proper treatment of intraperitoneal peritonitis is primarily a surgical one, except in the streptococcus type. Cases of subperitoneal cellulitis are not remedied at all by opening and draining the peritoneal cavity, as they do not attack the field of infection—merely the subperitoneal cellular tissues."—*From Dr. Murphy's notes.*]

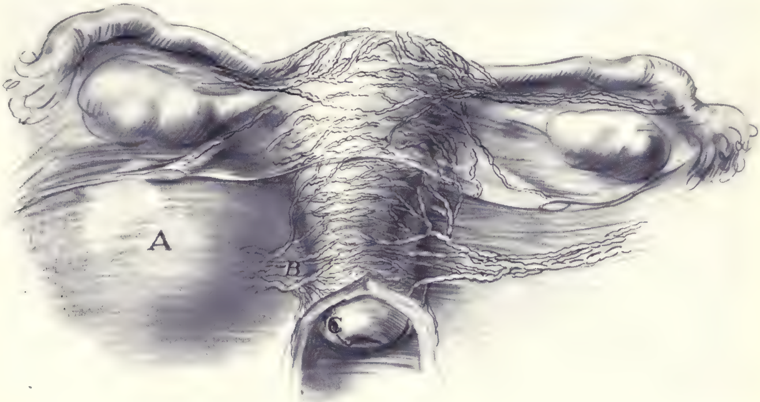


Fig. 241.—Pelvic cellulitis. At *A* is an intraligamentary or subperitoneal cellulitis due to infection entering through lesion of cervix (*C*), and traveling through lymphatics (*B*). The infecting organism is probably the streptococcus. Such a case is unsuitable for operation.

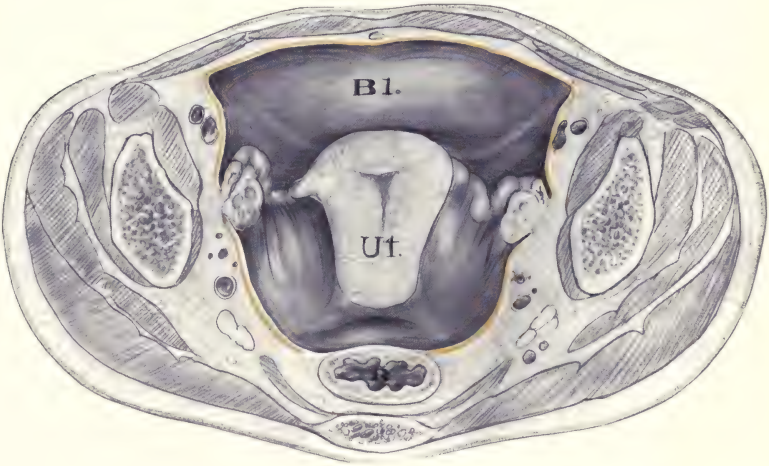


Fig. 242.—Pelvic infections. Subperitoneal streptococcic cellulitis. Yellow line indicates area of postparturient infection (puerperal fever, septicemia). It is impossible to drain because the infection is of the subperitoneal diffuse cellular type, and therefore is not benefited by the pan operation.

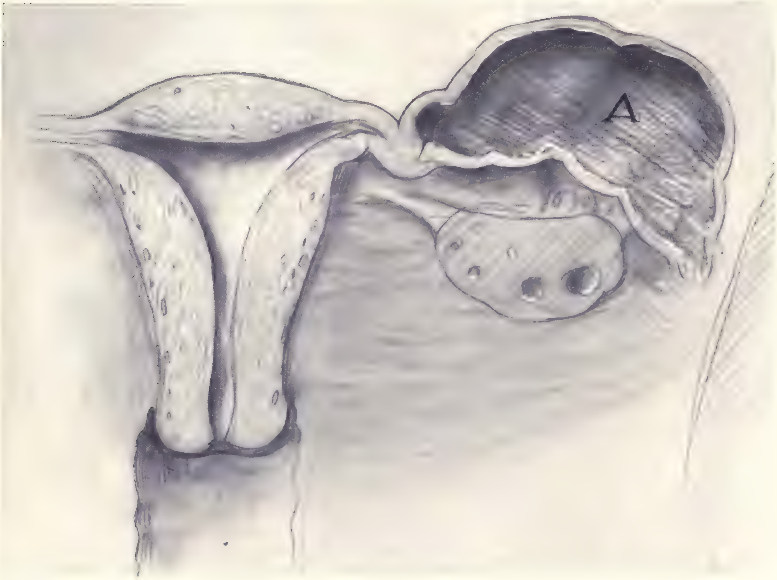


Fig. 243.—Pelvic infections. Pyosalpinx (*A*), infection traveling through uterine canal. Note sealing of uterine and fimbriated ends of tube.

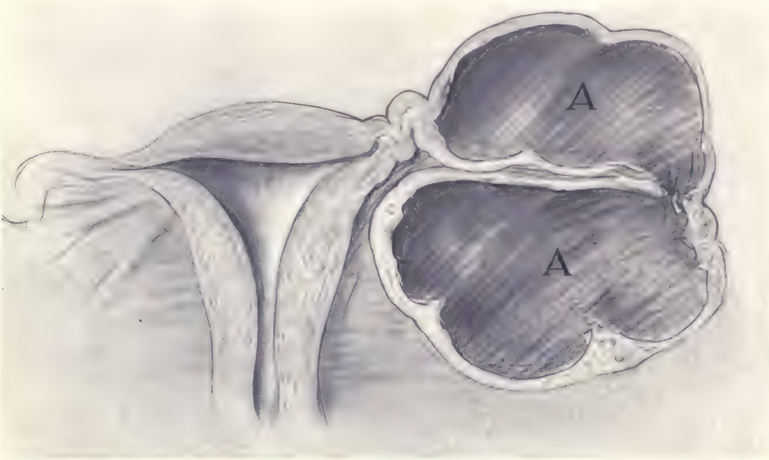


Fig. 244.—Pelvic infections. Tubo-ovarian abscess (*A, A*). Note sealing of uterine end of tube.

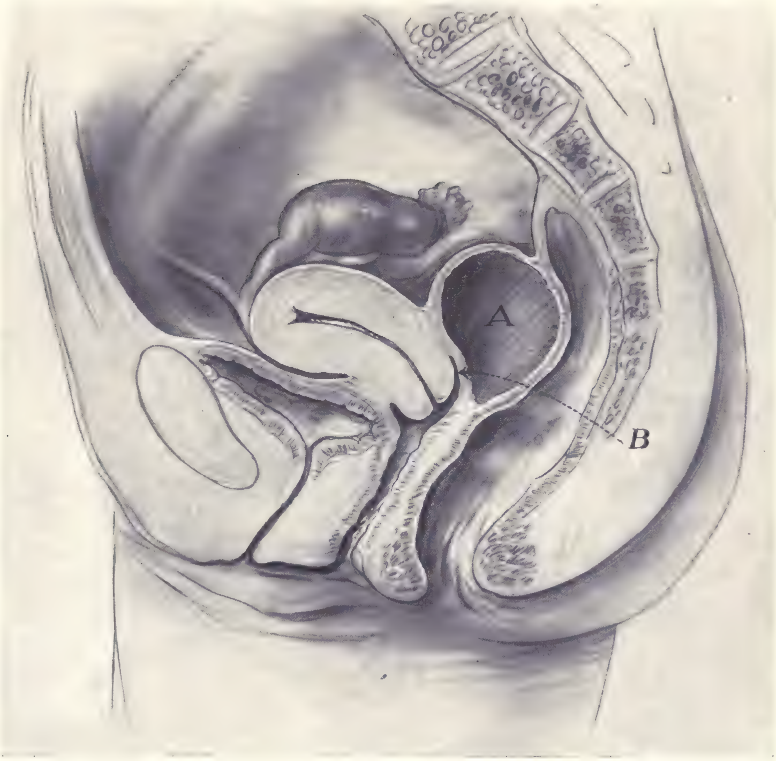


Fig. 245.—Pelvic infections. *A*, Abscess in Douglas's pouch not communicating with tube. *B*, Point for incision and drainage after exploratory puncture. An abscess in this situation should *never* be approached by the suprapubic route. Note pyosalpinx on right side.

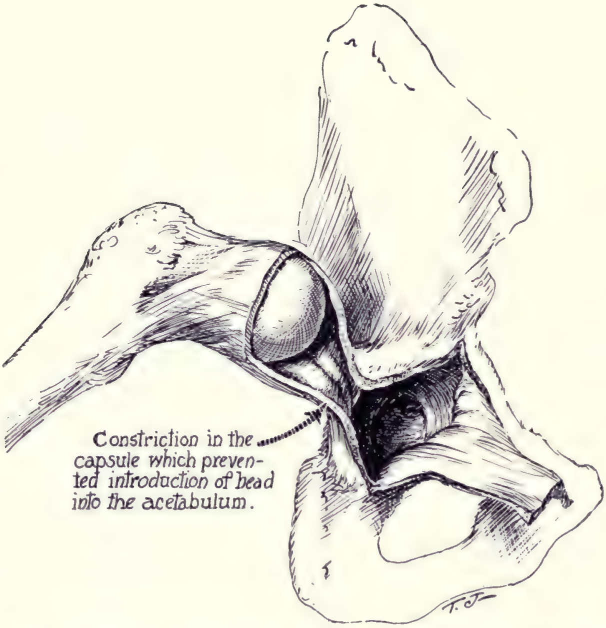

Constriction in the capsule which prevented introduction of head into the acetabulum.
T. J.

Fig. 246.—Case of congenital luxation of hip. Note obstacle to reduction without open operation.

An Unpublished Operation by
Dr. Murphy

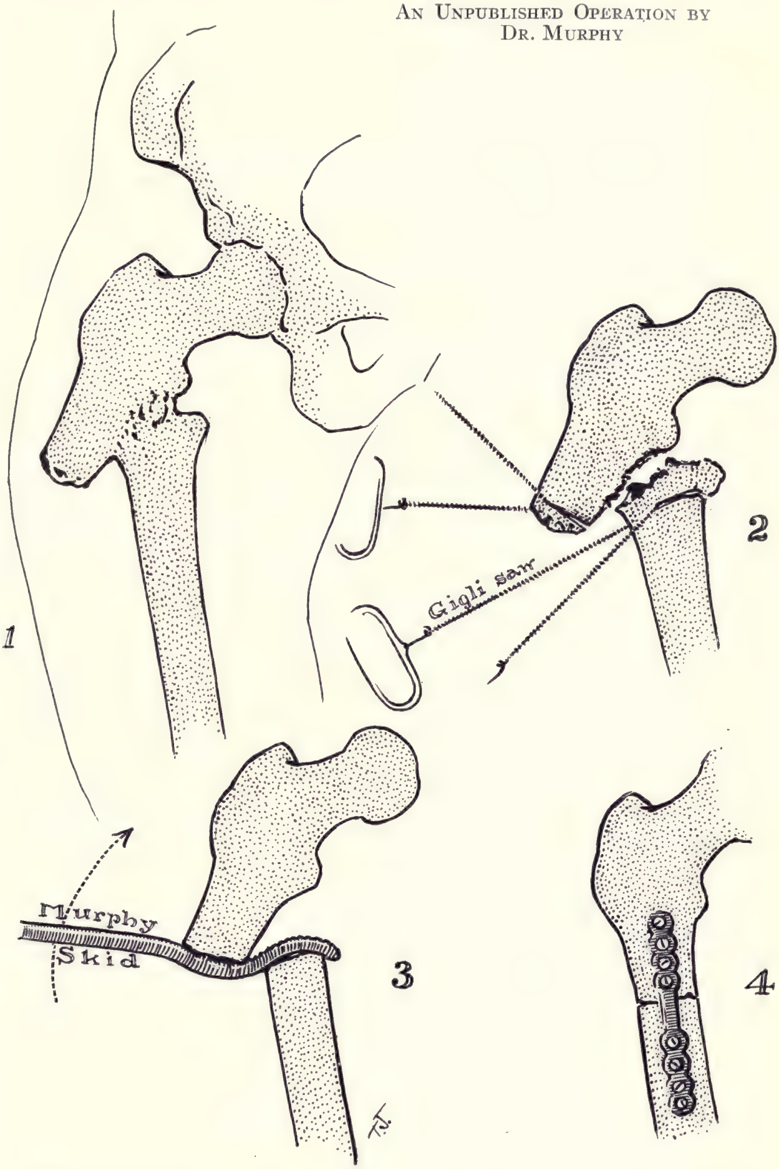


Fig. 247.—*1*, Shows line of malunion and great deformity; *2*, shows division and freshening of ends by Gigli saw; *3*, method of using the Murphy skid for the elongation of the limb and the adjustment of the fragments; *4*. Lane plate in position.

TOXIC GOITER WITH MELANCHOLIA—STRUMECTOMY

CLINICAL HISTORY OF PATIENT

THE patient, a married man of twenty-six years, was admitted to Mercy Hospital February 2, 1915. The family history reveals that one brother was operated upon by Dr. Murphy for a mental condition developing after a skull fracture. In 1907 the patient had an ulcer of the rectum, and in 1912 he was operated upon for varicocele. He had eczema until three years ago. He had pneumonia one year ago, and remained in bed five weeks.

The trouble was four years developing, when the patient went into business. After being in business but a short time he had some altercation with a relative, and immediately following began to be nervous and depressed. He has delusions of persecution, and does not sleep over four hours at night, and that sleep is disturbed. His memory is fair. He is depressed a great deal, and when alone, will pace the floor. He wants to fight, and will pick a quarrel with any one who comes near him. He is weak, and has attacks of vertigo off and on. He has fainted three times in the last three weeks. The bowels are constipated, and the stools are very often ribbon-like. His eyebrows are getting thin. He never drank to excess. He has lost about 25 pounds in weight. He has no headaches unless he abuses his stomach. In 1906 or 1907 he was struck upon the skull back of the ear while playing football, and was unconscious for two or three minutes. At present he cannot stand a blow on the head without getting unconscious. He has been unconscious about a dozen times in his life from blows on the head received in fist-fights, football, etc.

Examination by Dr. Murphy (February 1, 1915).—There are many depressions on his skull, particularly a central depression along the top. There is a great irregularity of the skull. The patellar and upper extremity reflexes are normal. The pupils respond normally. The heart and lung sounds are normal. There are no adenopathies. The rectal trouble which he formerly had is completely cured. He has no exophthalmos. There is a very slight enlargement of the thyroid gland. Blood-pressure is 138. Urine shows hyaline casts, but is otherwise negative. The physical findings are negative. He was referred to Dr. Mix, who concurred in the diagnosis and advised the removal of the thyroid gland, which is probably the etiologic factor of his condition.

COMMENTS

Dr. Murphy (February 4, 1915): This patient comes in to us because of extreme nervousness. He is unable to get along in business; he is unable to get along with his friends, and he is unable to get along at home. Everything annoys him. In looking for an etiologic factor for the nervousness, we examined his thyroid gland. He has a little enlargement of his thyroid gland, but still enough to make it an etiologic factor. We have two other quite similar cases in hospital now, both with enlarged glands and with slight exophthalmos and tremor, but the chief symptom for which they were brought in was the peculiar mental condition, and the patient I mentioned in particular was brought in because she unjustifiably suspected her husband of infidelity.

OPERATION

We are making the usual incision. . . . There is a parathyroid. See the vascularity of that gland! There is no colloid degeneration in it at all. The size of the gland bears little relation to the degree of intoxication. That is particularly true where the Graves symptoms exist—where you will find a great big gland that has been present for years with colloid masses in it, and finally you will come to a little area, not larger than an English walnut, which will be the active area, and that is the area that gives the intoxication. . . . There is another parathyroid. See that yellow mass! You can scarcely recognize it.

There is your superior thyroid. You can see it shining through there.

Now we shall reconstruct the muscles first and then we will tie the superficial vessels. We are inserting a drain. We divided the sternocleidomastoid muscle. Remember you can divide any muscle transversely and then sew it again as long as you do not interfere with its nerve supply. Many years ago, when Mikulicz was in Chicago doing gall-bladder work, he cut the rectus muscle transversely toward the midline and then sewed it up and had no further trouble. That was many years ago, before that procedure was adopted here. In these goiter cases you put on a ligature wherever you have had a forceps. If you do not, when the patient coughs or sneezes some hours later you will have a serious hemorrhage. The surgery of the thyroid has been immensely simplified by the work of Crile, Mayo, and Kocher. Before you operate the differential diagnosis as to the type of goiter must always be made.

Pathologic Report.—Colloid adenoma.

Postscript.—The patient made an eventful recovery and left hospital March 4, 1915. He returned for examination September 10, 1915. He said he was feeling fine, that he was getting along in business, and that the world was coming his way. He was able to sleep from nine to eleven hours a night.

EXOPHTHALMIC GOITER—STRUMECTOMY. TALK ON SURGICAL PATHOLOGY OF THYROID GLAND

CLINICAL HISTORY OF PATIENT

The patient, a married woman of forty-nine years, was admitted to Mercy Hospital January 21, 1915. The family and past histories are negative. The menstrual history was negative—she had her menopause in 1913.

The present trouble began in January, 1914, following a period of considerable mental strain. The patient was depressed at times, cried and fretted a great deal, and was very nervous. This condition would last a few days, then she would be perfectly well for four or five weeks. About three weeks after the onset of the trouble she noticed that her heart would palpitate frequently and that she would get short of breath. She also noticed that the right eye was more prominent than the left. There has been a gradual enlargement of the thyroid gland and the tumor moves on swallowing. The veins on the right side are more prominent than those on the left. She has had no trouble with her voice and has had no diarrhea. She has lost eight pounds in weight during the past year.

Examination by Dr. Murphy (January 19, 1915).—The urine on this date showed three leukocytes to the one-sixth field; no albumin, sugar, or casts.

Both pupils respond to light and accommodation. The left is a little larger than the right. The patellar reflexes are normal. There is some Romberg. She has a pronounced hypertrophy of the right half of the thyroid. She has a slight protrusion of the eyes and a pronounced muscular tremor. Examination of the heart shows a slight bruit at the base with the first sound. The pulse is rapid, but not intermittent. The abdomen is thin.

There is no tumor mass to be felt in the abdomen. There is a slight laceration of the cervix. The uterus is perfectly movable in all directions. There is no induration in either of the fornices —nothing but a small Nabothian cyst in the anterior lip. There is no erosion or ulceration. There is no urinary trouble. There are no organic troubles anywhere. It is possible that the change associated with the hyperplasia of the thyroid may be the disturbing element. She is advised to have an operation.

COMMENTS

Dr. Murphy (January 23, 1915): This patient did not come in on account of the goiter: she came here on account of the neuroses. The goiter was diagnosed as the etiologic factor in the production of the neuroses. Nothing was said about the goiter in her statement. She did not recognize the tumor. She had recognized the tachycardia and she had recognized the tremor.

In looking over your classifications of goiter it is hard, with the modern advancements, to keep pace with the varying classifications, but at the same time classifying goiters and keeping them in the proper relationship is not difficult. We have endeavored for years to classify the etiologic conditions on the basis of the histology of the structures involved. If one does that, one has comparatively little trouble. In the classification of goiters we have divided them into three major groups, and these are in consonance with the histologic structures of the gland, namely, the tumors that originate in the vessels, the tumors that originate in the connective tissue, and the tumors that originate in the cellular gland structure itself. By adhering to that classification one has very little difficulty in handling these goiters as they appear on the operating table from an etiologic standpoint and not from an operative standpoint.

OPERATION

I first divide the platysma right down and then dissect that all free and expose the gland well up to the base. Then we pick off the sternothyroid and sternohyoid groups. . . . There is a parathyroid—you can see it right there. See that yellow mass on the end of my forceps! In doing the operation we endeavor to free the upper pole first. The vessels do not come, as one would believe, from without inward. They come into the gland from within outward. That is, the vessels go to the midline first and then come outward. Here is another parathyroid. Now we have the upper pole. There is a third parathyroid.

This patient came to the office because of nervousness, and in looking up a cause of the nervousness we found hyperplasia of the thyroid gland. Another feature about this case was that this tumor showed so very small in the examination and still, you see, it comes way down behind and is of considerable magnitude. Now, you see, I am wiping it out. In coming to the inferior thyroid one must keep right close onto the gland or one must keep a long distance from it, otherwise you are sure to injure the recurrent laryngeal nerve. This came up as a double lobe. Now we are down to the isthmus.

She came in complaining of nervousness and was suspicious of her husband. That is why he brought her here. She had been perfectly well up to something like a year ago, and then she began to suspect him of infidelity. She had these nervous phenomena first and they continued. The tachycardia was pronounced. The question we had to decide is, Was it a primary nerve lesion that upset her thyroid or was it a primary thyroid lesion that upset her nervous system? That was the proposition. That was the reason we referred her to Dr. Mix . He concurred in the opinion that it was the gland that was doing the mischief. We had a case here from Canada that had a somewhat similar train of symptoms with a pronounced evidence of intoxication—a hyperthyroidism. She was operated upon and all the symptoms disappeared. She was in such bad shape that we did not perform the operation primarily—in fact, we have not taken out the gland yet. We ligated the superior thyroid. She was not in shape to have the gland taken out. We felt she would die, so we did a ligation of the superior thyroid. We have had some interesting experiences in the ligation of the superior thyroid, and some of them were very unfortunate. In one case, from Detroit, the patient came in with a superlatively enlarged gland and with the most pronounced symptoms of a hyperthyroidism. We finally worked her into a condition where we were able to ligate both superior thyroids, which we did in the month of February. She improved and went home. The gland became very hard after the ligation of the thyroid and reduced to about one-third of its normal size. I went to Europe on my summer vacation and when I returned in August I had a letter from her saying that she had great swelling of the limbs, that she had albumin in the urine, and that the doctor said she had Bright's disease. I had her come at once to Chicago, and on examination found that the thyroid gland was still extremely large and that she still had the exophthalmos, but she was in the superlative stage of myxedema. She had lost all the hair in the axilla and all the pubic hair. Much of the hair of her head was gone, which you know is one of the most characteristic symptoms of myxedema. We started giving her fresh sheep's thyroid and desiccated thyroid, but to no avail. She died on the sixth day after she arrived. It was such a classic case, and so much like a case I previously had.

I started to tell you about the varieties of lesions of the thyroid gland. You have the lesions of the vascular system,—veins, arteries, and lymphatics,—the lesions of the connective tissue, and the lesions of the cellular gland structure itself. By keeping these three clearly before you all the time you can segregate into their respective positions these cases as they come to you. You take the vascular variety. The least common is the lymphatic variety, where you have a firm, hard thyroid that you can scarcely tear. When you come to look it over there is a great multiplication of the lymphatic channels, and it is a type of the lymphangioma that you see on the baby's cheek, which you know is so difficult to tear and which you have difficulty even in cutting. It does not pulsate. It is a hard gland. There are no large masses of accumulated products of the secretion of the cells in the glands at all. Then you have the venous variety, which is soft and pulpy, non-pulsating, and readily compressible. This is the variety that will stand away out with all the veins of the neck in prominence and that you can put your hands on and slowly compress, reducing it easily one-third the size. Then you have the arterial variety, in which you have the expansile, pulsating goiter, that with each pulsation lifts up and down. This is the type that bleeds so profusely and the one in which you must have a forceps ready to pick up every little bleeding point. You must be ready to clamp them off every one-sixteenth of an inch. If you try to pick up one of these glands by spreading the fingers from the side downward, as you can in the large nonpulsating goiter, you will have a hemorrhage that will be next to fatal before you can get it controlled. So from the pulsation of the goiter beforehand you can form a pretty good estimate of how much bleeding you are going to have in both the arterial and the venous varieties. I remember one I had many years ago in which, when I swung my finger around, it was just as though I was in the jugular. I had to compress it and pick it up every sixteenth of an inch. You can always stop it with a compress. Leaving these vascular varieties, you come to the varieties that are associated with the connective tissue. You have first the acute metastatic infections that give an enlargement and a hyperplasia of the connective tissue, an intoxication of the patient to the degree of delirium, lasting sometimes two, three, or four weeks, and occasionally terminating fatally. If they pass through the acute stage, these cases improve, go on, and finally the patient will come in and say, "Doctor, my hands are getting big, my lips are getting thick, my feet are swollen, my skin seems rough." Then you will know that he is having the secondary changes that occur after a connective-tissue infection of the thyroid, namely, that he is developing myxedema. I recall a case in a personal friend of mine, the wife of a doctor. She had an acute nasal infection, tonsillitis, and pharyngitis of the epidemic type that we had in Chicago in the spring of five years ago. Following that she had an acute metastatic nephritis with the urine full of albumin. Finally she went on in two months to uremic convulsions. We had to bleed her to relieve the uremic convulsions. Then the nephritis commenced to improve, but the albumin did not all go away. She left Chicago and went south for the winter. That was the following winter. After she went south she began to swell again and the albumin was present. She had recurrent attacks of diarrhea, with a high temperature—103° and 104° F. I was in the south at the time and saw her every few days. Her weight went to 320 pounds, until she was one great mass of blubber. I watched her day after day and still could not make out what the trouble was. Finally on the fifth day I said to the doctors, "This woman had an acute metastatic enlargement of her thyroid, and where is her thyroid now?" The gland had almost entirely disappeared. Then the diagnosis was as plain as a pikestaff. The hair in the axilla was gone. The splendid head of hair she had was gone. The pubic hair was gone. It was a clear case of myxedema. We put her on desiccated thyroid gland for two months and then put her on iodothyrin and she lost 200 pounds in weight. She recovered fully from that. Subsequent to that in California she got an acute infection in her nose and then an acute metastatic endocarditis from which she died. I merely cite that case to show what occurs following these acute infections. We had another case that went through practically the same course, but it was recognized early. She was put on desiccated thyroid early and got well. The other case in which the thyroid was an etiologic factor in producing the myxedema was a woman who had a tumor under the tongue. I did not recognize the nature of the tumor and took it out. When I split it, I immediately recognized that it was a thyroid gland. It was not of large size, but it was the only thyroid she had. In five weeks she developed evidences of a myxedema. We put her on fresh sheep's thyroid and she fully recovered. Finally we dispensed with the thyroid and she developed enough thyroid cells somewhere to take care of the metabolism.

Then you come to the next variety of tumors—those that are associated with an increase in the number of acini in the glands and a corresponding increase in the number of specific secreting cells in the glands. In other words, it is the hyperplasia of the glands that you see so commonly in young girls at puberty. That is a hyperplasia. There you have an increase in the number of cells and an increase in the number of acini, but you have no noticeable increase in a product that affects the patient,—which here is a colloid material—for colloid material is the normal secretion of the glands. Then you have a circumscribed enlargement which gives you an adenoma of the thyroid, made up of the histologic structures identical with the normal gland. Then, aside from the variety which gives you a circumscribed tumor, you have an increase in the secretion without a noticeable increase in the size of the gland, giving you a general colloid goiter with multiple colloid cysts and colloid masses all through the gland; and if it is a circumscribed increase with an increasing hyperplasia, you have flattening of the columnar cells, and, in place of colloid material, serous fluid, and then a circumscribed cyst, because the cells have been flattened and there is no colloid material. You open it as a circumscribed cyst. You can have multiple cysts without any manifestation of hyperthyroidism. Now, then, these are the changes that go to make up the ordinary enlargement until you come to the place where, either with a great or small enlargement,—often with very little enlargement,—you have produced more thyroid secretion than the patient can use in the metabolism, and then you have the symptoms of hyperthyroidism, or Graves's disease. There you have a multiplication in the number of cells and an increase in the quantity of secretion beyond that which is neutralized. Whether the amount is more or less than normal does not concern the surgeon. What concerns the surgeon is the fact that it is more than is neutralized. The patient comes in with all the manifestations of Graves's disease—the tremor, the tachycardia, the exophthalmos. By following out this classification and keeping to your histology you are able to classify each case as it comes to you. You have two varieties left—the malignant tumor of the sarcomatous type, and the malignant tumor of the epithelial type, which is the carcinoma. You have peculiar physiologic manifestations in the metastases of these tumors. Metastases of malignant thyroid tumors take place on definite physiologic lines. You know the growth of long bones is controlled by the thyroid gland. You remember the experiments of von Eiselsberg many years ago in which he showed that the growth of long bones was materially influenced by the thyroid gland. The metastases of carcinoma of the thyroid take place into the shaft of long bones more commonly than to any other place except into the lymphatics. It is a peculiar thing that the metastases of the sarcomatous lesions of the connective tissue take place also into the long bones, but not in so large a percentage as do the metastases of carcinoma—that is, there is a physiologic relation between the growth of long bones and the thyroid, and there is a pathologic relation between the metastases of malignant disease of the thyroid and the long bones.

In the after-management of these cases of hyperthyroidism we put them in bed, keep them perfectly quiet, and give them small doses of heroin, if necessary, for the nerve manifestations. That is practically all the medication they get—even when the pulse runs up to 160 or 170, as it sometimes does the second day after the operation. Do not meddle with them. Above all, do not give them adrenalin, which is one of the temptations. Adrenalin has no place in hyperthyroid cases. The patient often dies suddenly if you administer it. Put an ice-bag on the heart, but above all keep the patient perfectly quiet. A percentage of them has recurrence of the symptoms, but this percentage is comparatively small. The gland should be removed as soon as the nerve symptoms begin to show that they are increasing in severity.

MUSCULAR SINUS OF ARM—OBLITERATION OF SINUS

CLINICAL HISTORY OF PATIENT

THE patient, a girl of twenty years, was admitted to Mercy Hospital April 4, 1916. The family history reveals that one grandfather died of tuberculosis; otherwise negative. The patient's past history is negative as to diseases. She was operated upon for appendicitis October 21, 1913, and at the same time a cystic ovary, weighing ten or twelve pounds, was removed. She thinks that the rapid increase in the size of the tumor took place during the week of her last attack of appendicitis. She says the cyst was filled with blood. In September, 1911, she was vaccinated on the left arm, with the usual reaction, excepting that the entire arm from elbow to shoulder always remained tender to pressure. There was no swelling or discharge. The scar was red instead of white, and occasionally filled up like a blister, containing white or yellow fluid. Her menstrual history is negative.

On March 25, 1914, the patient contracted measles for the second time. The attack was mild, and she was in bed but one week. On the fifth day she had a slight earache on the right side, which gradually increased in severity. She had neither chill nor elevation of temperature. On the eighth day (April 2d) she was able to go out-of-doors, but still had the earache and a violent beating in the right ear. She says the right mastoid region was reddened and tender. The pain was so severe that she was unable to sleep. On April 6th she consulted a doctor, who said the ear-drum was bulged, but he did not open it. He treated it for three weeks with irrigations and local sedatives. At home the patient used ice-packs without relief. At the end of three weeks (April 29th), on Wednesday, she went to an ear specialist who punctured the drum. By that time the induration had spread down in the neck and toward the occiput and was red, swollen, and tender, but there was no opening externally. On Saturday, May 2d, a raised, hard, sore lump appeared on the mastoid, and the next morning she was operated upon for mastoiditis. She had very little fever, but some slight chills. She was in the hospital three weeks. The ear was dressed at first every day and then two or three times a week until July 1st. From September, 1914, to January 8, 1915, she had four or five attacks of earache on the right side, and the mastoid region was red and tender, but there was no discharge.

On January 8, 1915, at 6 P. M., the patient fell upon the icy sidewalk, striking on her left arm. The arm ached, but there was no sharp pain. She could use the hand, but did not try to use the arm on account of the tenderness. When she reached home she noticed that the blister over the previously mentioned vaccination scar had been scraped off and that a scab had formed. The arm hurt all night, but she slept a little. About 7 o'clock the following morning she had a violent aching in the upper third of the arm and in the shoulder, and the pain rapidly increased. She said there was a violent throbbing in the arm, that the pains began to shoot up into the neck, and that she had a violent headache. She had no chill. The arm became swollen and red, and at the point of vaccination there was an area about the size of a silver dollar, and more elevated than the rest. Then she began to have a fever, and her temperature soon reached 101° to 102° F., and in forty-eight hours 103° F. The pain was worse at night. In a week she was unable to eat, and the pain was so severe that she felt nauseated. She could not use the arm, which became very much swollen. She had no doctor for two weeks. The elevation of temperature continued all this time. She applied heat and cold without relief. The doctor came on Saturday, January 17th, and ordered wet dressings. On Tuesday, the twentieth, the doctor, while examining the arm, pulled off the scab, and pus shot out. It was greenish in color and had a bad odor. This gave her some relief. That afternoon she went to the doctor's office and the wound was probed. A sinus was found leading from the opening up and back toward the shoulder.

The wound drained slightly until Thursday, January 22d. Then she went to hospital and was operated upon—the sinus was cleaned out and iodoform gauze and tubes were put in. The temperature dropped. In five days the tubes were removed and she left hospital. Three days later—January 30th—another sinus formed, pointing toward the elbow. Then in two days another one formed, pointing toward the inside of the arm. She returned to the hospital and was operated upon February 7th. No tubes were inserted. She was in hospital about twelve days when another sinus formed, pointing toward the axilla. The arm was very swollen and red. On February 19th the arm was opened in several places and tubes were inserted. Then she improved gradually. She was in hospital until May 15, 1915. About every ten days to two weeks the arm would open again and discharge. She had a slight elevation of temperature all the time. She took stock vaccines without any noticeable relief. She went home on May 15th and on the seventeenth the arm opened again at the point of vaccination and continued to discharge a slight amount. In June she went to a specialist, who said it was an osteomyelitis, but the bone was not ready for operation. In July she had chicken-pox, and the arm pained more severely at that time.

On September 15, 1915, the patient went to a hospital, where the bone was curetted and tubes were inserted. She was in hospital ten weeks. She had a mild attack of renal colic in October. On November 26th she went home. There was still a serous discharge from the arm. On December 8th the discharge became purulent and continued until the latter part of January, 1916, when, with the sinus filled with bismuth paste, a skiagram was taken, which showed the sinus extending from one-half an inch above the elbow to one inch below the shoulder. On February 6, 1916, she was operated upon, and paste put into the bone and the wound packed. On March 5th she accidentally struck the arm with a book, and in one-half hour it began to discharge profusely. It had to be dressed every three hours until March 28th. She was very sick and vomited even water. She had a slight fever. The pain was excruciating when the arm was struck, and has been quite painful since, the pain radiating into the neck and back of the head. She has needed many narcotics for the pain. A tuberculin test made in July, 1915, was negative.

An examination of the urine, made on April 5, 1916, showed from five to ten white cells and from three to five red cells to the one-sixth field. White blood-count made on April 5th was 10,400.

OPERATION

Dr. Murphy (May 4, 1916): I am turning the outer portion of the fascia into the groove, filling that with a muscular base for my flap. You see that muscle fills the cavity.

Let the record show that there was no dead bone in the cavity, but a mass of granulations; the bone was not removed; the fibrous tissue was freed from its attachment to the periosteum; all the infected skin was removed; then the margin of the wound attached to the bone was freed and turned in so as to make an entropion of the lower or dependent portion and permit an ectropion of the outer portion of skin.

It came out very beautifully, and you see what a perfect ectropion we have of that skin.

Postscript.—The tube was removed on May 20th and there was no discharge. The wound had completely healed before the patient left hospital in June.

POSTERIOR LUXATION OF ELBOW—OPERATIVE REDUCTION—EXTRA-ARTICULAR NAILING—COMPRESSION NEURITIS OF ULNAR NERVE—TRANSFERENCE

CLINICAL HISTORY OF PATIENT

THE patient, a married woman of thirty years, was admitted to Mercy Hospital February 16, 1916. The family, past, and menstrual histories are negative.

On December 1, 1915, while crossing the street and stepping from block to block, the patient stepped short with the right foot, causing her to sway slightly to the right and then fall forward, landing on the palm of the left hand and the flexor portion of the forearm. When she fell, a cracking sound was heard in the arm. She was not rendered unconscious. When she arose, she found that she could not move the left arm. She does not remember the position the arm was in. There were no cuts present, and no fragments of bone protruded. The arm felt very numb. A physician was called who diagnosed the trouble as a bad sprain of the elbow, and applied cardboard splints on the arm from the middle of the humerus to the middle of the forearm. The arm was dressed at a right angle. The next morning the splint was removed because of the terrific pain which the patient had. The arm was greatly swollen and blue. The splint was loosened up every day for a week and a new one applied daily. There were no splints applied from December 7th to December 18th, during which time she bathed the arm with a solution of lead and opium. On December 18, 1915, a physician applied a gypsum case extending from middle of humerus to middle of forearm. The arm was slightly flexed when the case was put on. The case remained on from December 18th to January 3d, and when it was removed the arm was swollen, stiff, and she could bend the elbow but slightly. There was no pain. One week later another physician was called, a skiagram made, and a luxation of the elbow diagnosed.

On January 23, 1916,—under ether,—the arm was manipulated and then a half gypsum case was applied to the dorsal surface of the arm, extending from middle of humerus to middle of forearm. On February 6, 1916, the arm was again manipulated under chloroform. No case was applied. At the present time the arm cannot be extended to full length, and supination is not complete.

Examination by Dr. Murphy (February 16, 1916).—It is a posterior luxation of the elbow. Examination of the urine is negative.

COMMENTS

Dr. Murphy (February 17, 1916): Here are two pictures; in fact, you would think they were both pictures of the same thing. This is just like that—the same proposition. There it is after the reduction. You can see that it is a posterior luxation (Fig. 248). This woman before us today feels very unkindly toward her doctor, who is a personal friend. You can imagine what a humiliation it is to the doctor. Remember, we made fairly good diagnoses before we had the x-rays. The reason the man did not make a diagnosis was because he lost sight of the fact that there are three points that must bear the proper relationship to one another—the two condyles and the tip of the olecranon. With the elbow extended, if you have your fingers on the two condyles, the tip of the olecranon will be right on the same line. Had he just remembered that, he would have known that that was luxated. That is all you have to remember. These condyles and olecranon points will get you almost anywhere in connection with these elbow fractures and luxations.

The luxations that occur in this position are as difficult to handle as fractures. The most common fracture in the body giving an evil result is Colles's; next, Pott's; thirdly, fractures and luxations of the elbow. They keep getting doctors into trouble all over the world all the time. The reason they keep getting them into trouble is that first they do not make an accurate and definite diagnosis; secondly, they have not a definite mental picture of what is happening and of what should be done. In Colles's fracture,—where you have always a typical backward luxation of the lower fragment,—if you pull it straight, it is not reduced. No matter how much you pull you never reduce it. The only way you can reduce it is to increase the deformity and push it down. This is one of the things which you must remember, and you cannot do it in any other way. You can pull until you are blue in the face and you will not get it right. The same way with Pott's fracture. The doctor does not learn to ask the patient, "How did your foot turn, in or out?" When the foot turns in, it is never a Pott's fracture. Pott's fracture is always an eversion fracture. When you reduce it, you must bring the foot in—as far in as it can be brought. Then flex it at right angles with the leg. When it comes to that position, you know it is right.

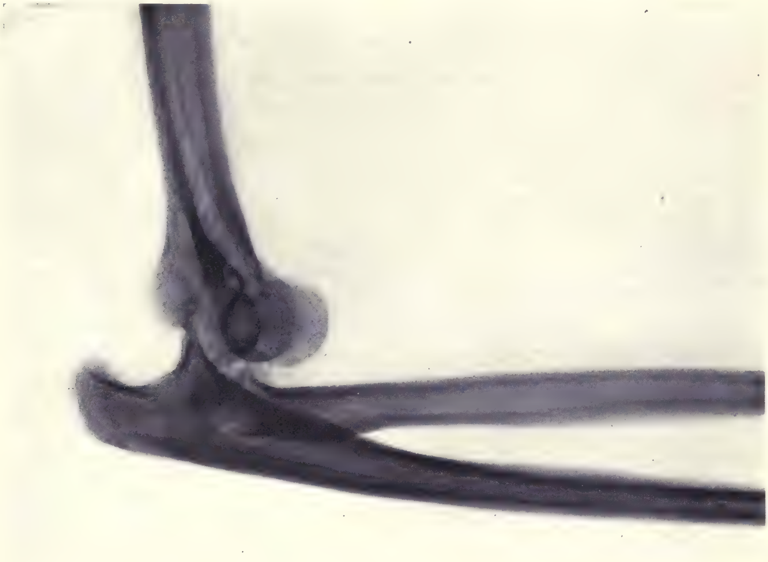


Fig. 248.—Preoperative skiagram showing posterior luxation of elbow. Note fracture of head of radius.

If it is a fracture of the condyles of the elbow with a partial luxation, there is no dressing that holds it plumb. The way to correct it is by a single finishing nail. When it is a compound fracture, then you treat it as an infected wound and do not put anything in. You should scarcely look in. I have the greatest respect for a compound fracture. When I was a student, if you had asked me what would you do with a compound infected fracture of the ankle I would have said, follow Billroth's advice, which was to amputate in the middle of the leg at once. The same conditions for infection are present to-day that were present then, unless you take some precautions to prevent them.

You can see the diagnosis from a distance in this case to-day. The cicatricial tissue that has organized in two and one-half months is what prevents me from getting it back to reduce it.

OPERATION

Now I have to divide the olecranon and open the joint. I must divide the olecranon near its tip so as to have a good support for the trochlea of the humerus to rest upon. There is the tip of the olecranon. What is going to be in danger right off? The ulnar nerve. I do not know where the ulnar nerve is in this particular case at this time. The next thing is, if you cut far forward you catch the branch of the musculospiral that comes forward, so you need to cut just about there [indicating]. I am coming down in here to the angle to see if this nerve has remained as it should in its relation to the condyle of the humerus, or whether it has been carried back. There it is. It must turn rather suddenly and come back here again. See these fibers that are binding the ulnar nerve, and see how beautifully they show! These fibers look like violin strings. See how they hold up there! See why the nerve is in a dangerous position!

This condyle appears to be carried back with it. We cannot tell that until we get farther in. There is the nerve. I want to get that out of harm's way. I want to take that olecranon off near its tip, but I want to keep enough of the olecranon. See how the fatty bursa has come in to fill up this space! Now, you see, there is the tuberosity. There is the articulation here. I wish to bring that olecranon tip back. Now it is back, and I shall insert the nail (Fig. 249). That is the internal condyle. We shall have to tip it a little more. I want to get it back to its normal relationship. I want to hold it there while I nail it in.

See! I am going to keep that nerve entirely out of its normal groove. If I let it go back, I will get into serious trouble with it. Now we have that in good shape. I am going to throw that nerve clear forward, so there will be no opportunity for it to get into a callus relationship because that could do the nerve serious injury. We just take off the epicondyle. That is the way in which we treat the nerve in cases of traumatic neuritis. We did not traumatize that joint. The reason we will not have a bony ankylosis is because we did not traumatize the joint, for we would have a bony ankylosis if we injured the joint severely.

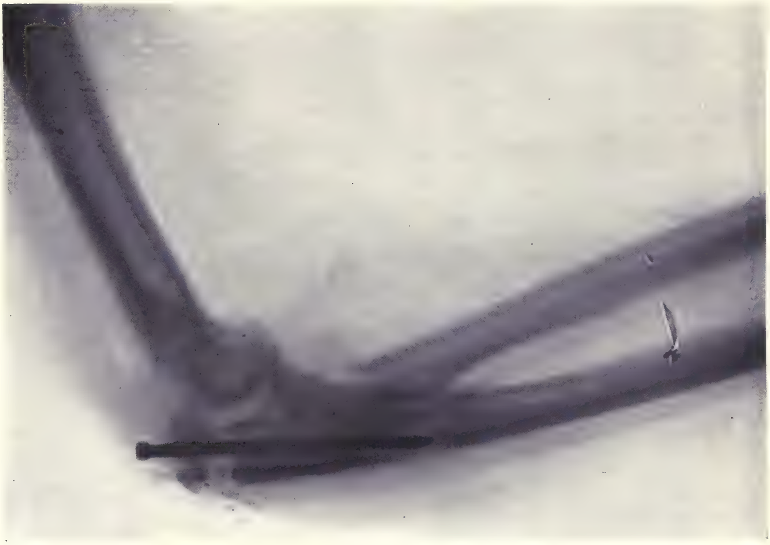


Fig. 249.—Postoperative skiagram showing reduction of luxation of elbow. Note extra-articular nailing to restore resected tip of olecranon to its base.

The stitches I am putting in now are to take the tension off the skin. If we had just a fracture of this olecranon without a displacement of the condyle, the treatment would be to take the olecranon, make a slit over it just large enough to admit the end of the nail, and then drive the nail through that slit and not open the joint at all. That is the treatment for fractures of the olecranon.

Now the ease with which that went back makes you wonder why you could not reduce it. I shall show you why in a moment. This will be dressed at right angles. The luxation will not recur as long as you keep it at right angles. After a couple of days the biceps strengthens up and you could not reproduce the luxation. In handling the ankyloses of the elbow-joint where you have a moderate amount of fat you have a fairly easy proposition. If the patient is very thin, you have difficulty in getting fat sufficient for interposition.

Let the record show that we first located the ulnar nerve and put it entirely out of the field; that we then divided the olecranon near its tip to leave a ledge for the trochlea of the humerus to rest upon; then we increased the flexion of the arm until the ulna could be thrown in; one nail was inserted; no ligatures were used; all the work was done without hand contacting.

This patient had the arm thrown to the outer side. She had a backward luxation about there [indicating]. Now how are you going to get that back? Just throw it clear back, use that as a skid, and it comes in again as easy as I made that demonstration, if you have it clearly pictured in your mind. When you have this luxation, you have the same proposition exactly—hyperextend it and cut that tip off. The only way you can get it through is by going clear out, make your reduction, and come back. You do not have to do any great trauma. It comes very readily. Go away out and just bring it back and the head comes back onto the capitellum. As long as you have had no separation of the head of the radius through the lesser sigmoid cavity—which should not be present—it comes right back into position. Now I cut that olecranon off so that I might have a good strong ledge for the head to rest against. Otherwise if I cut it short, it would slip by.

The commonest fracture in this position is a fracture of the internal condyle. Remember this is compact bony tissue and you get non-union because it is compact bony tissue. The only place you get non-union in cancellated tissue is in the neck of the femur. You think you are getting non-union in cancellated tissue, but you are not. That is compact tissue. When you have a fracture of the internal condyle, make the reduction and drive in a single nail right through the shaft. A single nail is all you need, and then close it up. Exactly the same thing occurs when you have a fracture of the external condyle. Reduce your displacement, which is entirely away from the joint, and drive in the nail. If both condyles are broken, put in two nails. You do not have to compound your fractures. Cut off the head of each nail. This elbow will be kept perfectly still for five weeks. In five weeks you will have a fairly firm union. Then take off your dressing and just start passive motion. Remember it was in vogue thirty-five years ago when I started to practise medicine to begin passive motion in fractures near the elbow-joint in a few days after the reduction. When you have a fracture near the elbow, begin passive motion early if you want to *insure an ankylosis.* When you have a fracture of the elbow or a fracture of any bone—supposing you start motion, what do you do? Just tear your wound apart, connective tissue forms, and you have more callus than you should have when union has taken place. Remember, with every fracture, and with every luxation, all the soft tissues are torn. Now, then, it takes from three to five weeks for soft tissues to heal. If you do not disturb them, they will heal without much connective tissue. Supposing you have an incision in the skin three inches long and you tear it apart as far as you can, what would happen? You would have great masses of connective tissue. The same thing occurs when you start passive motion, because when you tear it open it has to repair by connective tissue. More connective tissue means more contraction.

If it is a compound fracture, just close it up. At the Alexian Brothers Hospital—where we had an enormous fracture service—the first question we asked when a patient was brought in in the patrol was, "Did a doctor examine you?" If not, we knew at once that we would get it to primary union without suppuration.

There is a reason for the course I followed in connection with the ulnar nerve, and that is, that many times where you have a fracture about the condyle you have a little thickening of the bone over which the ulnar nerve has to run. The patients will come back in a week or ten days complaining of numbness in the little finger. Then, if you will wait a little longer, they will come back with atrophy of the thenar and hypothenar eminences, and then atrophy of all the small muscles of the hand. In these cases it is a traumatic neuritis from the irritation of the nerve. We have had, I suppose, a half-dozen cases (Vol. V, August, 1916, 661). Cotton, of Boston, reported the first really good article on the subject. It is just the irritation that produces the trouble. All you need to do to cure the trouble is just make that incision I made to-day, free the nerve, and sew up the wound. In three weeks they are perfectly well.

Postscript.—The patient made an uneventful recovery. The splint was removed permanently on April 4, 1916. She left the hospital April 30, 1916.

UNUNITED FRACTURE OF RADIUS—INTRAMEDULLARY TRANSPLANT

CLINICAL HISTORY OF PATIENT

THE patient, a single man of twenty-eight years, was admitted to Mercy Hospital September 16, 1915. The family and past histories are negative.

The patient broke the right forearm at the middle of the radius on July 24, 1913. Pain and swelling followed. In two days the doctor set the forearm and applied a splint. In twelve days he removed the splint and said that the broken ends of the radius overlapped. He reapplied the splint and the pain continued for thirty days, when the arm was operated upon and the broken ends were brought into apposition and wired. The arm was put in a gypsum case. Within four days the case was removed and there was found to be a purulent discharge from the incision, which healed in three days under hot fomentations. Skiagram taken at this time showed the bones in good apposition. Three months after the case was removed he found that the thumb could not be moved as before the operation, and that the hand was in adduction. A skiagram was then taken, which showed the broken ends touching the ulna. In December, 1913, he was again operated upon and a part of the broken ends was removed, and a plate was attached to both fragments. There was a purulent discharge from the wound for three weeks. The plate was removed and the incision immediately healed.

On May 25, 1914, a transplant from the tibia was made to the radius and a gypsum case was applied. In ten days he had a severe headache and an elevation of temperature which lasted two days. The case was removed. A great quantity of pus from the forearm escaped, and a purulent discharge followed for the next two months, when a sequestrum was removed and the wound healed in a few days. Since August, 1914, he has had only an occasional pain in the wrist. He is unable to push with the forearm. He can feel the non-union of the radius at the middle third. The hand is in adduction and abduction is absent. Pronation and supination are absent, and he is unable to close the hand.

Examination by Dr. Murphy (September 16, 1915).—The radius should be elongated as much as possible by putting in a half-diamond-shaped graft from the left tibia. Elongate the radius as much as possible and then endeavor to produce supination while he is under the anesthetic. If we cannot push it down enough, we must eventually take off a portion of that bone so as to make the wrist straight. It is partly displaced.

COMMENTS

Dr. Murphy (September 18, 1915): That is the story: the result is that there is non-union. Now, then, the patient had a fracture, and long after the fracture he had a transplant inserted, because there was non-union of one bone, and during the process of repair that arm was permitted to come around in this position,—a hyperpronation,—and it is practically impossible ever to get

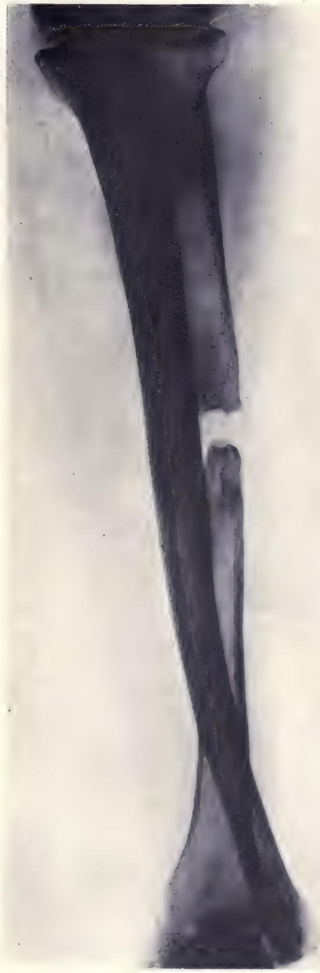


Fig. 250.—Preoperative skiagram showing fracture of radius in middle third with loss of substance, resulting in a gap. Note atrophy (tapering) of upper end of lower fragment. Note also luxation of ulna at wrist-joint.

that back again without doing some type of resection either at the upper or lower point. In the treatment of fractures of the forearm one of the essential things is to see that the patient holds the arm so that if a penny were dropped from the mouth it would fall into the palm of the hand. As a result of the treatment this man has hyperpronation. He has luxation of the ulna at the wrist-joint and he has non-union, which, however, had nothing to do with the pronation (Fig. 250).

OPERATION

I am cutting onto the ends of the bones so as to find the position of the ununited ends. There is the lower one. Here is the other. Formerly, you remember, when we were operating upon these cases, we cut in and carefully dissected out this little piece of connective tissue and left it. Now we clear the periosteum off the bone for an inch above and an inch below the line of fracture in order to get a subperiosteal clot to aid in the production of new bone. Any fragments of bone which we have we push down between the periosteum and the bone so as to stimulate osteogenesis.

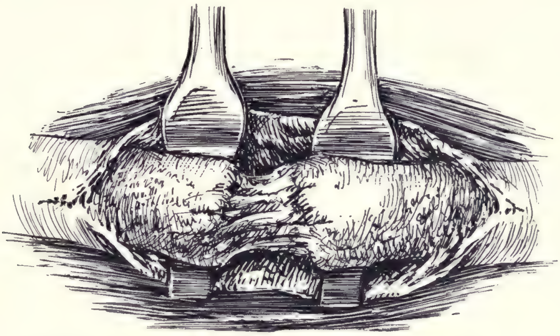


Fig. 251.—Ununited fracture of shaft of radius—operative exposure. Note dense fibrous mass occupying gap between fragments. Special emphasis was laid by Dr. Murphy upon this method of splitting periosteum and reflecting it from around bone-ends. Dr. Murphy's bone skids are shown in position on either side of fibrous union.

This is a dense fibrous mass (Fig. 251). I am using the scalpel until I get my field clear. . . . This is one of the most important factors in the process of repair. It is as important to my mind as the transplant itself. I do not wish to destroy the periosteum; I wish to elevate it. This fragment is bound to the ulna. Now we shall endeavor to get under the periosteum above and commence freeing that in the same way. . . . There is the fibrous capsule at the point of the pseudarthrosis. I am taking that off with cutting scissors. That is the joint-capsule that forms wherever you develop a pseudarthrosis. In the beginning of our work on arthroplasties we were fearful that we would not have sufficient support. The question was what would become of your ligaments. Nature makes ligaments and makes very good ones. That is a fibrous deposit trying to fix that to the under surface of the other bone. There is the posterior portion of that capsule. That is the capsule that was so hard to remove. If we permit that periosteum to remain, this fibrous tissue of the outer layer at once begins to develop fibrous tissue over the end of the bone and tends to the production of non-union. Now we have it free. There is the intermediate fibrous deposit which unites the ends of the bone and endeavors to immobilize it. There are the ends as shown there in the skiagram. We prefer to make an intramedullary graft here if we can.

Now I am just onto that bone. I am enlarging the lumen of the opening now by changing the angle. We want as large a graft as the shaft of the radius will hold. Now we have reamed that out and we will prepare to take the fragment from the tibia. In taking out the graft, never cut the skin directly over the anterior edge of the tibia—cut it over the tibialis anticus muscle and then displace it. . . . You see, I am taking this graft with the periosteum. Now we are going to elevate the fragment so as to get the alinement correct and to overcome the tendency to pronation as much as we possibly can. Now I shall shape the edge to drive that in. It is just about the right size. Now we are driving it into the upper end first, and then we will drive it back into the lower end. . . . Now, you see, that holds as no superficial plate could (Fig. 252). We are working out another scheme in connection with this line of work, that is, we are making a medullary metallic instrument in place of a plate, putting it in the medulla and slipping it in above and below in place of putting in screws.

Now I am covering that over with the muscularis so it will not come close to the skin to become adherent to the skin, as it was before. We rarely ever put on a ligature in this work. Occasionally a hematoma forms from the oozing, and when it does, then you aspirate the hematoma.

Let the record show that all this operation was accomplished without hand-contacting.

Now we are through. Now for the skin.

Let the record show that there was non-union; that there was a fibrous capping over the ends of both bones; that the periosteum was freed for an inch above and below the point of fracture; that there was a typic pseudarthrosis, with the development of a good annular ligament.

That is what happens in an arthroplasty of the knee and hip. You take out all your ligaments and you think that you can have nothing left for support. In all our arthroplasties of the knee—which is the most hazardous one to do—we have not seen one up to date that has had too much motion, showing how strongly these capsular ligaments develop.

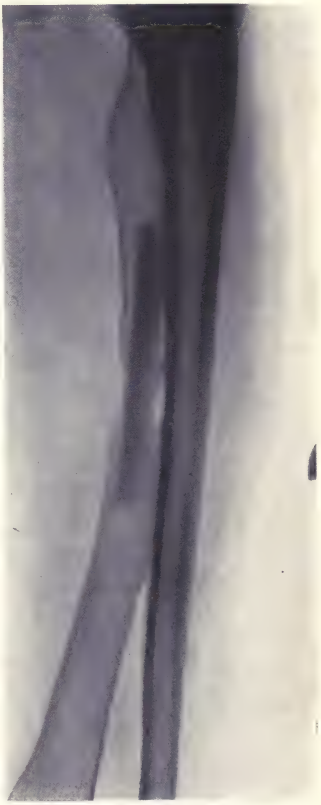


Fig. 252.—Postoperative skiagram showing intramedullary bone-graft splint *in situ*. Taken nine weeks after operation.

Now we shall dress this arm so that the hand will be in the relation I mentioned in the beginning of the work. I have explained to this boy that eventually I shall have to take out the lower end of the ulna, because it protrudes onto the dorsum of the radius, but there was no reason for doing this until he had union here.

There is no trouble following the removal of these grafts from the tibia. Remember, we have removed grafts the entire length of the tibia from one epiphysis to the other and taken two-fifths the diameter of the bone. The size of the graft cuts no figure.

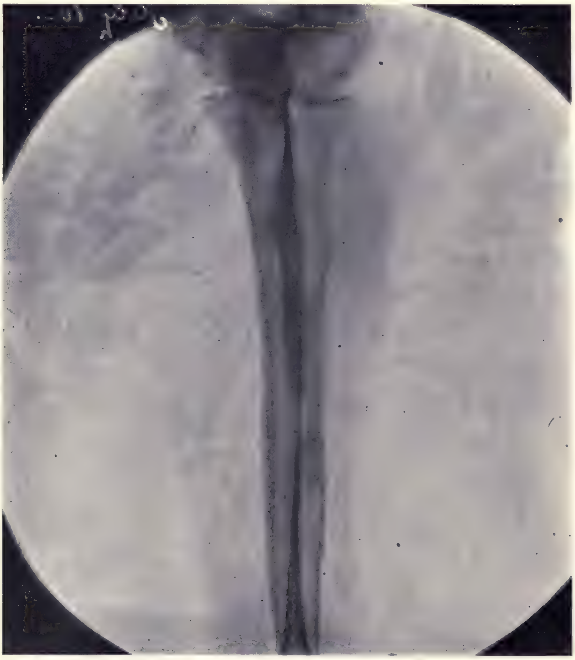


Fig. 253.—Postoperative skiagram showing perfect alinement of fragments of radius obtained by intramedullary bone-graft splint. Taken July 10, 1916, ten months after operation.

Postscript.—The wound healed by primary union and the patient left hospital November 4, 1915.

A skiagram was sent Dr. Murphy on July 10, 1916 (Fig. 253). In commenting upon the skiagram Dr. Murphy said that the alinement of the bones was simply perfect. He advised the patient to begin slowly to exercise the arm actively and passively so as to strengthen the growth of bone.

(Compare case published in Vol. V, August, 1916, p. 671.)

FRACTURE OF PHALANX OF FINGER WITH VICIOUS UNION—CORRECTION OF DEFORMITY; FORMATION OF NEW TENDON-SHEATHS

CLINICAL HISTORY OF PATIENT

The patient, a single woman of thirty-eight years, was admitted to Mercy Hospital February 16, 1916. The family history reveals that the patient's father died from carcinoma of the liver in 1915 at the age of sixty-eight years. Her past and menstrual histories are negative.

On December 10, 1915, while walking along the street with the ring-finger of the left hand held by the right thumb, index, and middle fingers of a companion who was walking about one foot behind her, and playfully bending the distal upon the proximal phalanx, the patient's right foot suddenly slipped laterally from her body and she lunged forward so that the right knee and palm of the right hand struck the ground. At the same time the ring-finger of her left hand was rotated forward toward the thumb by the companion who held it. She immediately arose, did not have any pain, but held the ring-finger of the left hand with the right hand. She walked about one block when she noticed that the distal half of the finger was too close to the little finger, and also that for the first time she had some pain. She walked one block further to a hospital, where her glove was removed. There was no cut or bleeding and no fragments of bone protruded from the finger. The doctor did not make a diagnosis, but placed splints on both sides of the finger. The splints were left on for nine days, until December 19, 1915, during which time she had no pain. However, there was a marked swelling over the distal part of all the metacarpal bones of the left hand. On December 23d a cardboard splint was put on the finger by the patient, but was removed in two days. After the removal of the first splint she noticed a slight flexion of the finger which seemed to become more marked in a few days. On December 25th a physician examined the finger and on the following day put on a splint which extended from about one-half of an inch distal to the finger to the wrist. This splint remained on until January 24, 1916. On January 1st a skiagram was taken and a diagnosis of fracture of the proximal phalanx of the left ring-finger was made. At the present time the knuckle is fixed in a flexed position. The sensation is good.

Examination by Dr. Murphy (January 31, 1916).—There is a splinter sticking up against the tendon. The upper end of the second phalangeal bone strikes, as shown in the skiagram. There is no bony ankylosis. It is a spiral fracture.

Examination of the urine is negative.

COMMENTS

Dr. Murphy (February 7, 1916): Here is a nasty case, and here is a case where you would sooner have a fracture of the tibia, femur, or forearm. Still it is but a fracture of the finger. Look at that skiagram: it is a typical spiral fracture. It is so fractured that the tip of that upper fragment strikes the second one so she cannot flex the finger. You see, the sharp point of that fragment goes into the tendon and she cannot use the tendon, so we have to open that in two positions and try to get it right. We must give her flexion power. She will always have a little rotation. I am not going to refracture the bone. She has a little rotation, but what concerns her most is that she cannot flex it beyond that degree [indicating] because she has a spiculum of bone sticking into the tendon.

OPERATION

There is a good callus on the inner and upper side. You cut down below and there is your callus. Now in going in to open a finger, if you have to go in on the palm or on the palmar surface, never go in with a longitudinal incision, always a transverse incision, but do not go far enough on the side to cut either the nerve or the artery. You know in draining a finger for an infection if you make a longitudinal incision the finger flexes down and down and never again recovers itself. That is a little matter, but it is one of vital importance to the patient.

You see there is no ankylosis, but it strikes. It comes so far and it strikes. The upper splinter is on this side; the lower splinter is on that side. That is just as it should be. Now we have the finger to treat. Now, you see, I am making this incision well over on the side, going through the skin over the joint, but I am going to try not to get into the joint. If I do get into the joint, I shall not mind because I feel I can control the situation from an aseptic standpoint. There is the point of bone that is doing the mischief. See it! See where it strikes! Now, when you look at that, you see there is a fragment of bone coming up. I am above it and I am coming down beneath it. Can you see that now? I am under the fragment of bone and taking the periosteum with it. Remember, I am entirely behind the tendon. There is the periosteum. I want to take off that periosteum, because if I do not, I shall have a reproduction of bone. It is a fracture with displacement, and the spiculum of bone across here strikes. Can you see it? I have not opened the joint. I am now going to sew this fatty tissue around the tendon so as to keep the tendon from contacting around this bone. Now we remove the constrictor. I want to cover this with fatty tissue, so the bone or tendon will not become bound. You see what will happen. She will have voluntary flexion, but not involuntary flexion. I am freeing this capsule so I am able to rotate all the shaft of the bone. See how nicely that comes over! You see the infinite care with which that had to be done, and you see why it is harder work than a fracture of the tibia.

Let the record show that the distal point of the distal fragment impinged against the phalanx; both sides were fractured, the rotation corrected, and fat and fascia inserted so as not to interfere with the sliding of the tendon.

Postscript.—There was a complete primary union. The stitches were removed on February 18th.

CARCINOMA OF BREAST—RADICAL OPERATION

CLINICAL HISTORY OF PATIENT

The patient, a widow of fifty-five years, was admitted to Mercy Hospital September 1, 1915.

The family history is negative to tuberculosis, but reveals that a paternal uncle and aunt died from cancer. Her past history is negative. She had the menopause one year ago. She has had a serous discharge from the vagina—enough to stain the linen each day since.

In January, 1894, twenty-one years ago, after she had been nursing her baby for four months quite constantly from the right breast, an abscess formed within ten days just above the right nipple. A physician lanced the abscess, relieving her of much pain. A little greenish pus discharged. The incision healed readily, but there remained a hard, movable mass about the size of a hickory-nut. This palpable lump in the upper and outer quadrant of the gland caused her no trouble until one year ago, when she noticed that it was increasing in size and was no longer movable. Up to July, 1915, there was no pain, but a gradual increase in size and in firmness. During July, 1915, she had dull, aching pains in the right breast. One month ago she began to have sharp, shooting pains in the tumor and axilla. A support to the right breast somewhat relieves the pain. In the past two weeks the pains have been more frequent and severe.

Examination by Dr. Murphy (September 1, 1915).—It involves the skin and the skin is fixed to the tumor. It moves on the pectoral muscles. The lymph-nodes under the breast are enlarged. The skin incision will have to be a transverse one in place of the usual skin incision, and the skin will have to be removed rather extensively on the proximal side, but not so far on the distal side. The chain of lymph-nodes is enlarged clear up into the axilla as far as one can feel. There are no palpable nodes above the clavicle. There is considerable adiposity, and the patient is well preserved. She has never had any trouble with the opposite breast.

COMMENTS

Dr. Murphy (September 4, 1915): This is quite a contrast to the case we had the other day in which the patient had the first manifestation of trouble as a simple small scale in the nipple, and following that she had occasionally a slight bloody discharge from the nipple (Vol. V, February, 1916, 7). Neither induration nor tumor was palpable, but still we made a positive diagnosis that that was a case of beginning Paget's disease. Paget's disease is always potentially a carcinoma. Microscopically it is not a carcinoma in its earliest stage. It should be called Paget's cancer in place of Paget's disease. Here is a case before us to-day in which that tumor has been present for twenty-one years. That was potentially a cancer. That mass is a dangerous mass. Remember, trauma is a very common cause of cancer of the breast, but I should not say it is the commonest cause. In this case you have, in addition to the lesion beginning in the lactiferous ducts, a typical depressed nipple drawn to the side. That is not the worst feature of that case. Its worst feature is that it already involves the skin. That is a terrifically dangerous type of cancer when it comes up. Remember, the cancer-cells begin in the bottom and they follow along and then come out toward the surface to involve the skin. It goes down like a tap-root when it strikes rock, then turns and comes up. That is the way with these columns of cells (*cf.* Fig. 201, Vol. V, October, 1916, 883).

OPERATION

In this case we shall not make a typic radical incision. We have to make a transverse incision and then run an additional incision up here so as to be able to remove as large a mass of skin as possible and at the same time keep the scar from forming a straight line in the axilla.

Now we take out the fatty tissue here and take this off from above. . . . There is the covering of the pectoralis major muscle in the field. We wish to take off that aponeurosis. We are not going to take off that muscle, but we are going to take off the aponeurosis of that muscle, as you see. Remember the carcinoma cells do not travel through the muscle. They travel through the loose connective tissue that is situated on the aponeurosis or capsule of the muscle. . . . There is the lower margin of the pectoralis major muscle. That muscle will be kept out of my field. . . . Now I go into the axilla. Here is the area now of lymph-node involvement. Now we turn that over and begin the preparation of the lower portion of the axilla. . . . Now we get ready to throw this pectoralis minor muscle out of the field. There is the margin of the pectoralis minor muscle. See it shining in my field now! Now let us get this pectoralis major muscle and free that. Remember, in our procedure we do not take out the pectoralis major muscle. We preserve it to fill the axilla. That is the pectoralis major muscle which I am freeing and throwing out of my field. Formerly I used to run my finger through that. We endeavor to do this now with the least possible hand-contacting. Now here is the place where you always have lymph-nodes—in that fatty tissue, that is, in that mass of loose connective tissue on the under surface of the pectoralis major muscle, between the pectoralis major and minor. That is one of the zones in which one has a return of the carcinoma. It is in that zone that the lymphatics travel. Here is the pectoralis minor. There is the lower margin of it coming nicely into the field. Here are enlarged lymph-nodes. We shall elevate the pectoralis minor entirely. See! There is the margin of it. There is the upper end of it. That gives you access to the axilla. You see what I am keeping these muscles for—to fill the axilla subsequently. . . . There is a vein right in my field. . . . There is a large lymph-node on the vein: it is going to be a hard matter to clear that without hand-contacting. . . . Now I am right up to the clavicle. There is an enormous lymph-node involvement here, as was outlined before the operation. I am making an accurate dissection of all the lymph-nodes and lymph-node-bearing and fatty tissues. . . . There is your pectoralis major. Here, unfortunately, is a large mass of lymph-nodes between the pectoralis major and minor—away up in the space. Usually you find one lymph-node and most often it is low down. These lymph-nodes are following along the pectoral branch of the vein. The most difficult part up to date has been to get these lymph-nodes away from the branch of the vein that passes out from the axillary in between the pectoralis major and minor. . . . Now we are coming onto the subclavian vein. This is the more dangerous place because of the attachment to the vein. Now I am going inside the pectoralis minor. . . . Now we have the axillary vein in view closely impacted in the carcinoma. Now I am going to try to free it above and come down.

This woman does not come under the regular law as far as metastases are concerned. She is fifty-five and looks more like forty-five. She is fat, and she is the type that has very early metastases in the lymph-nodes. The long dissection which we are making here is not so much in the hope of a cure as it is in the hope of retarding the progress of the disease. Fat, flabby people have the carcinoma metastasis very early and very rapidly. That is true of every type of infection, not alone of cancer. You take the people who are stout: they offer much less resistance to infection than thin people do.

Now we have a good exposure of the vein. I have many of the lower lymph-nodes free, but not the upper ones yet. . . . There is the axillary vein. I am endeavoring to take off the lymph-nodes from the vein without getting into it. If I cannot do that, then I shall have to suture it. It is firmly united to the lymph-node. This is a very difficult procedure, but we succeeded in getting it all out. Now you can all see it. There is where I pulled the little vessels off. That bleeding will stop with a little pressure, but you do not dare to leave the tissues that way, because when she coughs or vomits serious bleeding would arise. I described to you the other day the suturing of the subclavian vein (Vol. V, October, 1916, 865). Remember these veins have scarcely a plus pressure. . . . Now we are through with the axilla above. Now we come down below.

Now we begin to take off the breast. In the dissection it is very desirable to come from above downward in place of from below upward. I am removing all the fat now back to the latissimus. Now we have this fatty tissue out of the field and prepare to close up. We are using the pectoralis minor to fill in the axilla. We are inserting a drain. Now we have endeavored, in making this original incision, to go directly into the axilla. You see how nicely that comes together.

Postscript.—The stitches were removed on September 14th. There was complete primary union, excepting a little skin necrosis. It is a very good result for such an extensive dissection. One of the deep stitches which was carrying most of the tension in the axilla was permitted to remain and was removed on September 21st. No further report since patient left hospital up to June 1, 1916.

SINUS OF ABDOMEN FROM GANGRENE OF LUNG—CELIOTOMY WITH DRAINAGE

CLINICAL HISTORY OF PATIENT

THE patient, a single man of twenty-five years, was admitted to Mercy Hospital June 24, 1915. The family and past histories are negative.

On August 15, 1914, at about noon, the patient became nauseated just after eating dinner and vomited at about 12.30. About 3 o'clock in the afternoon he got a very severe aching pain in the epigastrium, the pain radiating to the right shoulder-blade. The pain continued severe for two days and then gradually subsided, but the aching was present for two weeks. He had no more nausea, but was in bed with a fever of 103°–104° F. He had no distinct chill, but an occasional chilly sensation. There was no particular soreness over the right side, no cough or jaundice. The bowels were regular, and no gross blood was present in the stools. There was a slight soreness over the right lower quadrant on pressure and a doctor diagnosed it as appendicitis. He was taken to a hospital and kept on a liquid diet for a week, but the high fever continued during the week.

On August 31st the patient was operated upon. He does not know all that was done, but says he was told that the appendix was removed and a tube drain put in, which remained in for two weeks. He was in bed seven weeks and then up and about for three weeks, the wound discharging a little pus. The soreness in the right side increased, and it became very painful in the right lower quadrant. He went back to bed and hot poultices were applied. The wound ruptured about one inch above the drain, discharged pus for about a week, and then healed. Pus has been discharging from the old incision ever since. The patient has gained some weight. The bowels are regular and digestion is good. The discharge is always pus or bloody pus.

Examination by Dr. Murphy (June 24, 1915).—There appears to be a thick pocket down outside the bowel. The sinus goes up a distance of five inches under the costal border. Resonance exists over the sinus. The sinus is to be injected with bismuth and a skiagram made. Examination of the urine is negative. The patient's temperature on the afternoon of the examination was 99.2° F.

COMMENTS

Dr. Murphy (June 29, 1915): That history, you see, is not in consonance with the story of an appendiceal infection. He had his nausea and vomiting first, *then* he had the pain, then the local sensitiveness, and then the pain referred down to the lower portion of the abdomen. He had an operation, and following the operation he had an extensive discharge of pus. The pus came out through the drainage-tube. That is the story. When you look at that case you would say there is an intestinal fistula. No. Why? Because when he ate jam, no seeds came through the opening. We called attention to that test many years ago. If you have a patient with a fistula connecting with the alimentary tract, the best test is to feed him strawberry jam and see if the seeds will come through. I have excluded fecal fistula. Then the question is, Where does this sinus go? We began percussing it, and we found that it passed up into the subphrenic space. Whether it passes into the anterior half and is a subphrenic abscess, or whether it passes into the posterior half and is a perinephric abscess, it is not easy to determine. We made a skiagram with bismuth. You see where the pocket of pus is. You see it is way down below. It looks as though he had an infection from a gastric ulcer, or from a pyloric ulcer, or from the gallbladder, or something that gave him a subphrenic abscess. There, you see, in the next picture the probe passes into the cavity. You will see in the next picture that the abscess comes fairly well up. That is made right straight across in front and you will see that the abscess comes fairly well up.

OPERATION

I am going to go in in front—that is, under the costal arch—and examine this situation and then determine whether it is in front or whether it is behind. If it is behind, I shall close this up here in front and then go in behind. . . . I am making a subcostal incision. I am going to divide this rectus muscle and I am going to divide it right straight across. I am going to resuture it when I get through. Remember you can cut a muscle straight across and resuture it, no matter what muscle it is, and have a full restoration of its function, while if you split it you may never have it reunite. I do not feel my sound. Here are adhesions. Here, look! are organic adhesions in the abdomen, showing that his lesion is an abdominal lesion. You see there are more abdominal adhesions fixed to the surface, apparently behind the anterior abdominal wall. The sinus passes up into the subphrenic space.

Let the record show that the liver is fixed to the diaphragmatic zone. See! There is where it is bound. I am going to endeavor to get in and open this abscess where it appears to be under the diaphragm. Here is a great deposit, showing we are near the center of the suppuration. Now I feel the sound through. I have found the surface of the liver and am under the diaphragm. It seems to me as though that was above the diaphragm. It appears as though that was the wall of the abscess and that it may be above the diaphragm. Now, you see, I am practically outside of the peritoneal cavity, because I am inside a mass of continuous adhesions. You see all that work has been inside the lower portion of it. There it is. It has an offensive odor. It smells like gangrene. It looks as though the man had originally pneumonia with gangrene of the lung. The diagnosis is right. I think I shall bring out the gangrenous portion of the lung. I found the track of the sinus from the inside, and came in between the diaphragm and the liver, which was firmly adherent. There is some gangrenous tissue from the lung. Now I shall drain this from behind. That will be the easiest place to drain it.

Now the question arises, Did this infection begin above or below the diaphragm, and did it begin as pneumonia? There is the history of an acute illness, but diaphragmatic pleurisy, basal pneumonia, or ulcerations in the abdomen—any number of these cases come to us for operation for appendicitis, for operation for gastric ulcer, and for operation for duodenal perforation, and unless one is on the alert, he will operate many times for gallstones, appendicitis, etc., when the case is one of diaphragmatic pneumonia, except that it involves the diaphragmatic pleura as diaphragmatic pleurisy. I recall an interesting case of this type. I was called by telephone to come to operate for intestinal obstruction in a child within a hundred miles of Chicago. In questioning the doctor about the case, he said the child had been sick three days, that he had an enormous distention of the abdomen, and that it had been impossible to get a bowel movement. I asked him what the temperature was, and he said the temperature was 103° F. That told the story—that it was not intestinal obstruction, because a temperature of 103° F. does not go with a mechanic obstruction. I thought then it was appendicitis and decided to go out and see the case. On arriving I found the child with an enormously distended abdomen. He had not vomited, except on the first day, which meant that it was not intestinal obstruction. With intestinal obstruction you always have emesis increasing in frequency with increase of time. In reflex vomiting you always have emesis decreasing with increase of time, because your reflexes are becoming less and less pronounced. They respond less and less as time goes on. Examination revealed that the child had typic pneumonia with consolidation and diaphragmatic pleurisy. The elevation of temperature showed that it was not mechanic obstruction, because in mechanic obstruction one never has initial elevation of temperature.

I am reuniting that muscle end to end. There should be little or no drainage from the upper tube. There should be a long period of drainage in the lower tube, because there is considerable of a cavity.

You will find in my analysis of ileus that diaphragmatic pleurisy is one of the regular conditions which can produce symptoms of intestinal obstruction. Pain, nausea, and vomiting, inability to get a bowel movement by the ordinary means, and coprostasis—that is what we call ileus. Ileus is not a pathologic entity. Ileus is merely a train of symptoms, and the train of symptoms which I just mentioned is present with diaphragmatic pleurisy, just as with gall-stones and very often with renal calculus, but you have to differentiate the symptoms and segregate them back into what particular group is causing the symptom of ileus. In non-mechanic obstruction cases the nausea and vomiting are practically always reflex. For instance, in a renal calculus you have pain, nausea and vomiting, and you have the pain referred in these cases usually to the loin and sometimes reflected on down the abdomen, on down the bladder, and on down into the testicle. You have the nausea and vomiting diminishing as time advances. That means that the nausea and vomiting in these cases are reflex manifestations, while if you have mechanic obstruction in either the small or large intestine, as time passes on you have the nausea and vomiting *increasing* in frequency. That never occurs in the reflex type, so you know right off what the trouble is. Diaphragmatic pleurisy gives a reflex on down the muscles of the abdomen. If it is high up, it makes a reflex in the neighborhood of the gall-bladder. If it is low down, it makes a reflex over in the neighborhood of the appendix. That is what has led to these errors in diagnosis. The temperature, however, is a very important guide.

In our analysis of the cases of ileus we divide ileus into three grand classes:

First, cases of ileus where you have symptoms due to inflammatory sepsis and reflex causes.

Second, where you have symptoms due to hypermuscular activity, as lead colic.

Third, where you have symptoms due to mechanic interference with the progress of the feces through the alimentary canal.

Now you see that this last class alone represents true intestinal obstruction. All the other classes have symptoms of ileus, namely, pain, nausea and vomiting, distention of the abdomen, and inability to get a bowel movement. These are all due to other than mechanic causes. If you will go through the literature and read one of my first articles on intestinal obstruction, you will find that I studied the results to see whether more cases were cured by operation than without operation. If they had all been mechanic obstructions, you see there would be no question as to the result, but the fact that, included under intestinal obstruction, there were a large number of conditions that got well because there was no mechanic obstruction of the bowel, but there was a train of symptoms resembling a mechanic obstruction.

This case to-day was a very instructive one. We shall have considerable drainage from behind, but the opening in front should—and we believe will—close up.

Postscript.—The patient made an uneventful recovery. A report received from him in July, 1916, showed him to be perfectly well.

SUBMURAL ABDOMINAL ABSCESS—LAPAROTOMY, DRAINAGE. TALK ON DIFFERENTIAL DIAGNOSIS OF CERTAIN ABDOMINAL TUMORS

CLINICAL HISTORY OF PATIENT

THE patient, a boy of three years, was admitted to Mercy Hospital December 15, 1915. The family history is negative. The child was born at full term and weighed seven and one-half pounds. Podalic version had to be done before the child could be delivered. At the age of six months the mother noticed that he seemed to pass considerable urine for a child of his age, and called the physician's attention to it. He was given some medicine, which seemed to help him. He had chicken-pox at the age of two and one-half years.

During January, 1914, the mother noticed that the child was passing gravel in the urine, that he cried on urination, and that he had a lump on the left side of the abdomen about the umbilicus about as large as an egg. At this time he walked with a stoop, as a person does following an operation. A physician's attention was called to this, but he said nothing and just gave him some medicine for the urine. Then the gravel and the pain on urination subsided. He gained in weight and looked well.

On September 1, 1915, the patient's bowels were constipated, and the mother noticed that the stools were clay-colored. He had no fever, jaundice, or pain. After being given a cathartic, this condition cleared up.

On November 21st the child cried on urination. His abdomen was distended and the navel parted. On feeling the abdomen the mother found a mass about the size of a grape-fruit low down in the center of the abdomen and extending to the left. It was hard and wood-like. It seemed to change position. The mother thinks that the pain he experienced on urination caused him to retain his urine. He passed no blood or pus in the urine, but it was lightly colored. Some days later, when the mother was measuring a specimen to send to the doctor, she filled an eighteen-ounce bottle and had about six ounces over. The child, however, had not urinated for twelve hours. His gait was stooped, as if carrying a weight. His color was yellow and sallow. His condition has remained about the same ever since. He has lost about ten pounds in weight. He has never passed blood or mucus in the stools.

On December 10, 1915, the patient was given a dose of tuberculin subcutaneously. His temperature at 12 P. M. was 99.2° F. The amount of tuberculin given is not known. At 10 A. M., December 11th, his temperature reached 101.2° F. and then gradually receded. The mother has never noted whether at intervals he has passed large amounts of urine. He has had no pains in the bones or joints.

Examination of the urine made on December 14th was negative. The patient was sent to hospital to be examined under an anesthetic.

Examination by Dr. Murphy (December 15, 1915).—There, you see is a tumor. You sometimes have this retention due to a stone impacted in the urethra. There is no stone that I can feel in this urethra. There is some calcareous material on the mouth of the meatus. Now let us see how much urine, if any, is retained after the bladder has been emptied. There is no urine coming out. Here is a great big hard mass,—woody hard,—with no urine escaping. This is a male child and not a female child. If you felt this mass in a female child, you would say it is a dermoid, but a dermoid in a male is not common. There is some urine coming up on the side of the kidney. The mass is hard as wood and does not feel like a distended bladder. It runs way over here almost to the left side. It is adherent and fixed to the left wall of the pelvis. It is free entirely from the right wall of the pelvis.

Now I shall examine it from the bowel side. You know you not infrequently have a cyst here, the sequence of anterior spina bifida, pushing this up. You know you have postsacral dermoids which occur in the male and less frequently in the female.

Let the record show that I think I feel the empty bladder below; this mass extends over to the right side and does not extend down into the pelvis at all; it is above the pelvis; it is pushed up above the bladder apparently when the bladder is filled and is not a bladder lesion.

You see my finger is well up above the level of the pelvis and above the promontory of the sacrum; it is all above the promontory of the sacrum; it does not feel like a mass of feces, as in the case of a megacolon. You know in a dilated colon you sometimes find enormous masses of feces. One patient had 50 pounds of feces in a megacolon. My finger does not contact with this separate mass of feces. It is possible that this is a megasigmoid. A megasigmoid, however, is very rare. A megasigmoid circumscribed into a pocket of this type would be rare.

Let the record show that the mass is bony hard, like a dermoid; we emptied the bladder fully and found that the mass was entirely above the promontory of the sacrum and fixed to the patient's left side.

It is possible that we have one of the anomalies of genitalial development within the pelvis. His testicles are both present below. At times you have an ovary in the abdomen with a testicle below; at other times you have an entire absence of the testicles below and instead have two ovaries above. Occasionally in the female you have two ovaries above and a failure of complete development of the genitalia below—a malformation.

We shall let this child rest from this examination and prepare to perform celiotomy to see if we can remove the tumor. We shall get the bowels thoroughly emptied.

COMMENTS

Dr. Murphy (December 16, 1915): This is the interesting case of the day. The question that arises in this case is, What relation has the urination to the mass? Is the enlargement a dilated bladder-wall, and is the frequency of urination due to pressure on his bladder which interferes with urination; that is, is it a primary bladder lesion or is it a secondary bladder manifestation? That is what we have to think about. The findings in the urine have been negative. Yesterday we catheterized him, the same as we are doing now, and took out a lot of urine and then made an examination by rectum and found that the mass is above the promontory of the sacrum leading over to the left side. Both his testicles are down. We discussed the proposition of this being an undescended testicle, a supernumerary testicle, or of its being a cystic kidney away down here in his side. We cannot palpate his kidney above. You know you cannot palpate kidneys of this size in a baby. The skiagram shows no stone nor does it outline the tumor. I thought it might be a stone impacted in the neck of the bladder that is giving the retention. There is no indication of a stone at all. When you make an examination of the mass, it seems to grow out of the pelvis. Then we concluded that it was not a part of the urinary tract—that it was something else. It is hard as wood. It is not in the pelvis. It is above the promontory of the sacrum, and can be reached only from below. By stretching your finger to get it up you can easily feel the promontory of the sacrum. It is above that level and runs over to the patient's left side.

Now the question that comes up is, What is it? One of the things you think of is a dermoid. If it were a female, you would say that was what it is. But remember that dermoids in the male are rare. The next thing you think of is sarcoma. After that, a dilated large intestine—a megacolon. Then, after that, you plead innocent and say you do not know. That is the story.

There is the mass. You see it is as hard as wood. You would think of a dilated urachus displacing the tissues to one side or other. That is one of the things it could be, but the real fact is that you have no statement on which to base a diagnosis without an exploratory operation.

OPERATION

I am dividing the sheath of the rectus muscle. It seems to come very close to this muscle. The question is, Is the lesion in the anterior abdominal wall? That is what it feels like now.

There is an induration. See it shining through! Now I can use a typic Celticism and say, "I do not know where I am at." I should like to get into this abdominal cavity above the tumor and see what it is before I open it. He has had fever all the time, which can come with an infected dermoid, and which can come with a sarcoma without infection. It looks to me as though we were going to get into an infection before we opened the peritoneum. If that is true, we would sooner open it without opening his peritoneum. It is inside the peritoneum: Look! It is not a dermoid, therefore. That puts a desmoid, the possibility of which we also considered, out of the question. But a desmoid in a child of this age I never saw and never read of.

Now we shall aspirate this mass. I do not know whether that is pus or *brie*. It is a white material. See the thickness of this wall! It has a necrotic center and is some type of an abscess, which accounts for his fever. We shall see whether it is tuberculous. That is fine! That is a great relief to all, including the patient. You see the interpretation of the bladder irritation being secondary to the lesion is the right interpretation. We shall make cultures of this pus for his treatment as well as for diagnosis. I am looking to see if there is any *brie* of any kind. There is no evidence of its being a dermoid. We have had all together three dermoids in all our experience. We have had a great number of desmoids.

Let the record show that this abscess was adherent to the anterior abdominal wall; we succeeded in opening the abscess without opening the peritoneal cavity; that there was an enormous thickening of the wall, which is suggestive of the colon bacillus type of infection.

Colon bacillus infections give a larger infiltration than any other type of infection you have, except the mycotic type. In the mycotic type—like the actinomycotic infections—you have an enormous infiltration with but a very small quantity of pus.

There is not the odor to this pus that there is from an appendiceal abscess. There is one thing certain, and that is that the baby has a good chance of recovering.

Pathologic Report.—Cultures from the abscess of the abdominal wall showed a pure growth of staphylococcus. Cultures on blood-serum did not show any growth.

Postscript.—The patient made an uneventful recovery and left hospital in a few days.

FIBROID OF UTERUS—SUPRAVAGINAL HYSTERECTOMY

CLINICAL HISTORY OF PATIENT

THE patient, a married woman of forty-eight years, was admitted to Mercy Hospital September 7, 1915. The family history reveals that the patient's maternal grandmother died of carcinoma of the lip. The patient had pneumonia at the age of twenty-two. She has been married twenty-six years and has had four children. Fourteen years ago, after the birth of the last child, the uterus was curetted, resulting in a slight infection.

Menstruation has always been regular—every twenty-eight days, four or five napkins for three or four days. Three years ago the patient began to notice that the menstruation was varying in quantity and the periods were either longer or shorter. November 1, 1913, she was ill for four days with menorrhagia. On November 20th she had an immoderate flow, lasting for five days. For the following months she flowed once a month, but the period, after starting in in good order, would stop for a day or two and then start again and continue for three days and then cease until the next month. She consulted a doctor September, 1914, who found, according to her story, a protruding fibroid which could be easily felt in the vagina. He cut off the protruding portion at the external os and she had a slight hemorrhage for ten days following.

Menstruation continued to start and stop twice or thrice a month until June, 1915. Since then the patient has flowed constantly, excepting at night or when at rest. On the least exertion about the house there results a slight but constant metrorrhagia, only relieved by rest in bed. This condition continued until three weeks ago, when all signs of blood disappeared and the discharge became watery. She cannot feel the growth, has very little tenderness, no pain in the region of the uterus, but has occasional gas pains, which are thought to be due to the foods eaten.

Examination by Dr. Murphy (September 7, 1915).—There is no erosion of the cervix; no polyp protrudes. The uterus is as large as a medium-sized cocoanut and movable. The heart-sounds are full and normal and not materially increased in frequency. There is no evidence of a return of the polyp, but a fibroid is present for which an abdominal hysterectomy is indicated.

Examination of the urine is negative.

COMMENTS

Dr. Murphy (September 9, 1915): That is a fairly classic history, with the exception of the statement of the flowing after excision of the protruding polyp, which I take it was what was removed. The patient had this polyp removed, and following that she had another hemorrhage. You will note another statement, that the flowing occurred when she was exercising or doing much, but it is not a flow in the sense that she has a hemorrhage. That is different from an intramenstrual flow that comes with a carcinoma of the cervix. The intramenstrual flow that comes with a carcinoma of the cervix is a severe flow. The patient will flow more than the normal quantity in the menstrual period, and then five, six, seven, or twenty days afterward has a sudden large flow and then a reflowing again at the regular time. That is the hemorrhage of a carcinoma, and is so characteristic of carcinoma when it occurs in the menopause zone of the patient's life.

OPERATION

I divide that aponeurosis, as you see, one-half to three-fourths of an inch to the left of the midline, and then displace all the muscle-fibers upward. There is a large quantity of fat here. Now I will push this properitoneal fat out of the field and bring up the peritoneum. Always cut on the slant—never directly on the forceps. If you cut on the slant the air rushes in and you do not cut the intestines or the omentum which might be held in the forceps. This looks as though it were an intra-uterine fibroid because it has dilated the uterus almost uniformly. I should say it is within the uterus. That would be indicated also by the clinical history. It does not come up the same as an intramural fibroid would. There is the tumor, you see, in the anterior wall of the uterus. We will do a hysterectomy.

[Usual hysterectomy performed.]

Let the record show that the operator, in closing the field, inspected it for instruments and sponges to see that none remained; and that Sister Laurian reports the sponges counted and correct.

Let the record show that the fibroid was intra-uterine; that it elevated both cornua almost equally; that the usual hysterectomy by division from behind forward was performed; that we ligated each of the uterine arteries separately and closed in the stump in the usual way; and that there was no bleeding.

That is a diffuse endometritis, but no excavation anywhere to indicate a beginning carcinoma. You see it is intra-uterine, coming right down close to the mucosa.

Let the record show that there were no pelvic adhesions; no evidence that there had ever been an inflammatory condition in the pelvis.

ADOPTION OF AN ATTACHED PEDICLED FLAP FOR THE CURE OF AN IMPASSABLE STRICTURE OF THE URETHRA

BY GEORGE W. HOCHREIN, M.D.

I wish to describe an operation which I have adopted for impassable stricture of the urethra, which is, as far as I am able to determine from a careful search of the literature, an original operation.

The patient, a male thirty-three years of age, was admitted to Mercy Hospital September 27, 1914, because of inability to empty the urinary bladder.

Eleven years before, in August, 1903, he had gonorrhea which lasted for seven months. For six years following this he had chronic urethritis. In July, 1905, he began to have trouble in urinating, with loss of power and a divided stream, followed by dribbling. This condition slowly grew worse until in October, 1910, he had great difficulty in emptying the bladder. There was frequent urination—15 to 20 times during the day. It was hard to get the stream started, and the act would last from fifteen to twenty minutes. In May, 1912, the stream became very small, being only about the size of a thread, and there would be considerable dribbling for some time after. This condition continued up to the time of the operation. The patient was kept in bed for a period of one week after admission to hospital, and during that time repeated attempts were made to pass a filiform bougie, with failure each time.

OPERATION

The operation was performed October 4, 1914. A sound was passed down to the stricture. Then a perineal incision was made

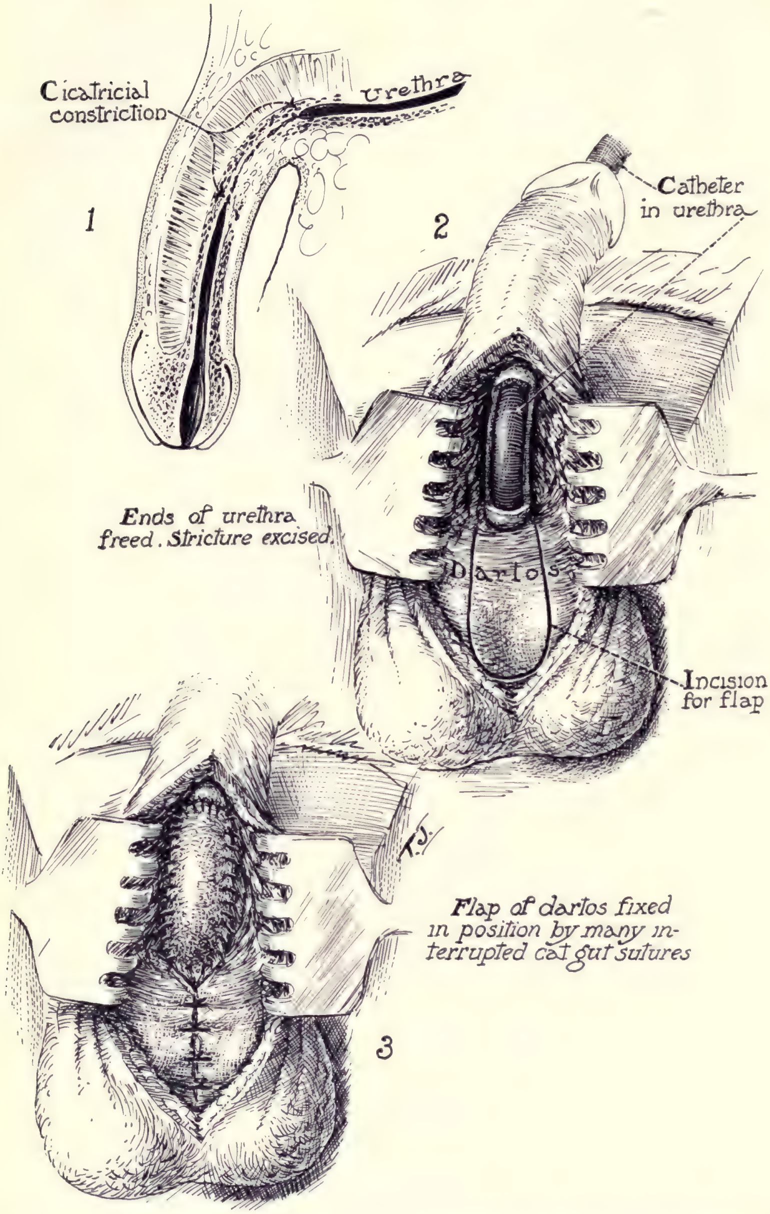

Cicatricial constriction
urethra
1
2
Catheter in urethra
Ends of urethra freed. Stricture excised.
Darlos
Incision for flap
Flap of dartos fixed in position by many interrupted cat gut sutures
3

Fig. 254.—Dr. Hochrein's operation of urethroplasty after resection of impassable stricture of urethra.

in the median line, extending down to the tip of the sound. On straightening the urethra I was able to find a small pin-hole opening, and an incision through the dense mass of scar tissue led me to the proximal end of the urethra. The stricture was located in the posterior portion of the pendulous urethra, and was about an inch and a quarter in length (Fig. 254, 1). On account of the massive, hard, cartilaginous nature of the fibrous tissue I deemed it advisable not to do any of the customary operations, so devised the attached pedicled flap to close in the destroyed space of the urethra. The scar tissue was removed, both the distal and proximal ends of the urethra freed, and a No. 24 French soft catheter was passed into the bladder and fixed to the external meatus (Fig. 254, 2). An attached pedicled flap of dartos was then freed, large enough, when shaped in position, to give me a canal twice again the normal size. This was then fixed in position with interrupted catgut sutures closely placed along the sides of the tissues on each side of the catheter and to both ends of the freed urethra (Fig. 254, 3). The wound was closed. The catheter remained in position for twenty-one days and was then removed.

For the first time in nine years he had a normal stream, and it has remained so ever since. I have passed a No. 27 French sound from time to time to determine if there had been any recurrent constriction, and up to date the canal has maintained its original caliber.

The same scheme could be carried out by making a penoscrotal incision, as shown in Fig. 254.

HYDROCELE—ANDREWS BOTTLE OPERATION

CLINICAL HISTORY OF PATIENT

THE patient, a single man of twenty-five years, was admitted to Mercy Hospital December 7, 1915. The family history is negative.

In 1906 the patient was walking along the top of a fence and fell astride of it, injuring his testicles. These injuries healed uneventfully. In May, 1911, he was operated upon for left-sided varicocele, which had been present about one and one-half years and which at times was very painful. Immediately after the operation the left side of the scrotum began to swell, and in twenty-four hours it was about the size of a small orange. It was discolored and seemed to contain blood. He consulted a physician, who gave him medicine to apply locally and told him that it would get better. It gradually grew smaller.

Two years later, in March, 1913, the patient had mumps, and about the second week of the disease both testicles began to swell, and on the left side there seemed to be fluid in the scrotum: he is not sure of this, however. They remained swollen for about ten days, and gradually receded to normal size. Not infrequently during the following summer the left side of the scrotum would swell up and remain swollen for two, three, or four days and then gradually recede. This swelling was prone to appear after a hot day, when he would drink a great deal of water. He had no pain in the scrotum.

In the middle of October, 1915, the left side of the scrotum began to swell and attained the size of a small orange. The patient had no frequency of urination except when drinking large amounts of water. He has a slight burning sensation on urination. He had no pain in the kidneys, nor did he pass blood in the urine. At times following urination a whitish material would be passed. The scrotum has remained about the same size ever since.

Examination by Dr. Murphy (December 6, 1915).—The patient has a hydrocele on the left side. There is no evidence of degeneration of the testicles as a sequence of the mumps, nor any evidence of tuberculosis. The entire mass is translucent.

COMMENTS

Dr. Murphy (December 9, 1915): This is a case of hydrocele. You divide hydrocele into two classes—first, essential hydrocele, which is a hydrops of the tunica vaginalis without any disease recognizable by the microscope; secondly, the symptomatic hydrocele, due to some lesion in the testicle. The commonest lesion that gives rise to hydrocele is tuberculosis; with that you have fluid in the tunica vaginalis—a clear fluid in the early stage. The second lesion is sarcoma, and the third, syphilis, and so on, including the metastatic lesions that occur in the testicle from other lesions in the body, but the two essential things you have to bear in mind are symptomatic and essential hydrocele.

As to the diagnosis, when the fluid in the tunica vaginalis is a serous fluid without blood, you can make the diagnosis with comparative ease. When you have sarcoma of the testicle, it is very difficult to differentiate between sarcoma and syphilis of the testicle—extremely difficult, even when you have it open and can see the gross appearance. Where you have a sarcoma, however, you many times have a bloody fluid. A bloody fluid in a serous cavity is practically pathognomonic of sarcoma or cancer when it is not associated with trauma, so that when you come to aspirate the fluid from the tunica vaginalis and find it bloody, or when you come to expose it and find it is bloody, you can conclude at once that you are dealing with a malignant lesion—just the same as when you have blood in the pleural cavity not associated with trauma it means that the patient has sarcoma or cancer of the lung, or of the structures in the neighborhood of the pleura. The same holds true in the peritoneal cavity, for when you have blood in the peritoneal cavity the patient has a sarcoma involving the peritoneal surface in some position, or else carcinoma. Remember, it does not need to be carcinoma—it can be sarcoma. The same is true in the pleura.

We figured from this case that it was essential hydrocele. There is, however, one dubious element in it; that is, when I examined it here and when I examined it in the office there appeared to be a greater resistance at one place than there should be with essential hydrocele.

OPERATION

Here is the thickened tunica vaginalis, as you see it here [demonstrating]. It is extremely thickened. It gives very much the same picture that you see in chronic hydrops of the knee—the same thickening everywhere. In the management of these hydroceles we almost always do the operation worked out by our colleague, Dr. E. Wyllys Andrews.

Let the record show that there is no lesion of the epididymis, globus major or minor.

Look! I just turn that tunica vaginalis inside out. This is the bottle operation. That is what it was before. This is what it will be now, so you will have an endothelial lining now in contact with the connective tissue, and that will undergo a change back to the connective-tissue type of cells. I am sewing that so it cannot recur. This is what is known as the Andrews bottle operation.

I am coming right close up to the sac. There, you see, is the pocket—a great big cavity. Just turn it into that cavity.

Postscript.—The wound healed *per primam* and the patient left hospital in the regular time.

UNUNITED FRACTURE OF FEMUR—PARHAM-MARTIN BAND

CLINICAL HISTORY OF PATIENT

The patient, a single woman of thirty-two years, was admitted to Mercy Hospital January 13, 1916. The family history reveals that one sister died of pulmonary tuberculosis. The menstrual and past histories are negative.

On December 1, 1915, the patient was in a railroad accident. She lay in the wreckage for ten and one-half hours, and when found, had a few scalp wounds and was bruised all over her body. The left lower limb was broken about six inches above the knee-joint. Below the point of fracture the knee was swollen, with a lump as large as two fists, which disappeared upon lying down. The skin was not broken. The limb was set the next day and dressed with traction and splint to keep it straight. The traction was kept on for about four and one-half weeks and then was removed. Following its removal, when she was moved in bed, it was found that the fragments were displaced, and that, by using traction, they could be reduced into apposition. The displacement always caused her severe pain. Her limb felt much better with the traction on it. At present the traction is on and the fragments are in good alinement.

COMMENTS

Dr. Murphy (January 15, 1916): This picture shows one how deceptive one skiagram can be. That one to the left [demonstrating] would indicate that the patient had an almost perfect apposition; that there was not a thing that should be done with it. Remember it is only six weeks since the fracture. When you look at the picture on the right you see there is no apposition at all. One picture was made three minutes after the other, which shows how very deceptive a skiagram can be. Now, then, the question that comes up in your mind is, Shall we treat this case as an ununited fracture, or shall we treat it as a case where there was a failure of apposition and where, therefore, there is no effort at union? That is the proposition that comes up. It is not quite a spiral fracture, although it may have somewhat that relationship when it goes in. It looks like a transverse fracture with a little turn at one point. You cannot call that a failure of union. You cannot call that fracture at the end of six weeks a failure of union, unless you should find when you get in that there is no effort at the formation of callus. If there is no effort at the formation of callus, then you will have to treat it as an ununited fracture and perform bone-grafting. If there is an effort at the formation of callus, then we shall treat it as a primary fracture and either put on a Parham-Martin band or put in a Lane plate. The tendency now is toward bone-grafting. Why? Because we know that a graft immobilizes better than a bone plate, with which we many times have failure of union. We know that with a graft we rarely fail to obtain firm union. The insertion of a graft in the femur is not so easy a proposition as the insertion of a graft in the humerus. The greatest difficulty, however, in the preparation of your field in this case—the freeing of the new capsule—will be absent. That is where I had all my labor in the previous case. That will all be avoided here, because there should be no such capsule at the end of six weeks.

That is our plan in this particular case. It is in the process of repair here. If we put in a clamp and a Parham-Martin band, we hope to get union. This band was worked out by Drs. Parham and Martin, of New Orleans.* It is applicable, however, to only a small percentage of cases, and I doubt if I can use it in this case; still, it might come together in such a relationship that I can put on a spiral clamp of iron.

OPERATION

You see the shortening. We shall not put on a constrictor. It will bleed profusely at this particular point, however. In operating for non-union of a bone one is never justified in putting on a plate. You remember Mr. Lane, in his talk in this amphitheater, made that point very clear—that for non-union you must not plate. Primarily he believes in the plating of all fractures, but he is just as positive in one direction as in the other. That was beautifully shown in a case we had on Wednesday where the patient had splendid apposition with a plate, but not the slightest effort at union. Remember that was a secondary operation and not a primary operation. This case is essentially a primary operation.

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* *Surg., Gynec. and Obstet.*, November, 1916, 541.

Now we have to free the periosteum for an inch above and below the fracture. I am fearful lest that element of the repair of fractures should not be sufficiently appreciated. Why do you free the periosteum? There are several reasons: First, if you should study a fracture, wherever there has been laceration of the periosteum in the shape of a triangle a hematoma forms and you always have a mass of callus. Experiments show the same thing. If you swing the end of the periosteum out into the muscle a considerable portion of that triangle will fill up with bone, giving you a chance to develop a subperiosteal callus, which is always the first callus that forms in the process of repair. The medullary callus is the second, and the intermediate or definitive is the last, to form.

There is the line of fracture. Never cut through the quadriceps and never cut through the flexor group. By cutting through one of the intermuscular septa you get more bleeding, but you do not have the muscle fixed to your bone. . . . There is the vastus internus muscle. Now there is a fragment of muscle. There is the upper end of the lower fragment. There is a piece of muscle in between the ends of the bone. Can you see it nicely? That is the etiologic factor for the absence of callus. Here, where the periosteum is torn, there is an effort at the production of bone. Look! There is the overlapping. There is an effort at the production of callus—a fairly good effort. See it right in there! See where it overlaps! I must cut the periosteum off. Remember, we are right near Hunter's canal, where the vessel hugs the bone. We must be careful, because that is where the vessel hugs the bone. Look! There is your non-union. See!

There is your fibrous continuation. . . . I am freeing the periosteum. There is the muscle that was in between the ends of the bone. I am getting that out. . . . There is an effort at soft callus formation. Now we have the other end nicely in view. We shall get this end free. See how that muscle rests over the end of the bone and binds it down! That never could have united. It would have been a physical impossibility. I think I can put a band on this. See! I have absolute apposition. We have a sharp angle here, which I must try to correct. That is a splendid little clamp. We have the bones in good apposition. Now we have the two bones together in good apposition. We shall use just the band. Next we shall get the lower fragment adjusted and apply our band. At last you have perfect apposition of the ends of the bone. You can scarcely see where the fracture existed. That is the best method of mechanic bone apposition that was ever devised, and were it not for the infections and for the non-unions that occur in connection with bone plating, it could be used unhesitatingly.

You see while we have been working all the bleeding has stopped. That has a decided advantage in the subsequent reparative process.

Let the record show that, notwithstanding all our manipulation, we succeeded in doing the work without hand-contacting; that the bone was readily exposed and freed; then we adjusted it to the clamp, which we felt would be sufficient to hold it; that there was an effort at the production of callus on both sides, and for that reason we did a band operation in place of a graft operation; that all the bleeding had ceased before the operation was complete; that the fascia lata was united so as to prevent a hernia of the muscle following the operation.

Postscript.—The stitches and gypsum case were removed on April 11, 1916. The patient left hospital May 3, 1916, and the result is shown in the skiagram.

OSTEOMYELITIS OF FEMUR—AMPUTATION

CLINICAL HISTORY OF PATIENT

THE patient, a married man of thirty-seven years, was admitted to Mercy Hospital September 8, 1915. The family and past histories are negative.

When the patient was thirteen years of age he had an earache for a day or two, followed by a purulent discharge from the ear. He was immediately taken with high fever and was delirious for two and one-half weeks. Then signs of inflammation were noted in both knees, the left being worse than the right. The left knee was lanced and much pus was removed. It continued to discharge during the illness, which lasted three and one-half months. Then the ear and knee stopped discharging and the wound healed readily, but the left knee was ankylosed in flexion without pain.

When nearly fifteen years of age the patient was taken to a surgeon who corrected the deformity, straightened the leg, and wired it. A discharging sinus on the internal and external surfaces of the left knee remained for the following ten years, at which time the inside one closed permanently, but the outside one continued to open and close until the present time. He had no pain until seven months ago, when he felt a piece of loose bone at the opening and tried to remove it with his finger, but failed. A throbbing and severe pain with fever and chilly sensations followed. The doctor removed the bone and ordered irrigations. Small pieces of bone have occasionally been removed by the patient. The pain has been constant for the past seven months. He has lost 24 pounds in weight and thinks he has had fever during this time, but no chills.

The knee will be explored to see whether there is a possibility of curing it by local operation; otherwise amputation will be necessary.

COMMENTS

Dr. Murphy (September 10, 1915): The patient had first "malaria" and then the ear trouble. How long had he had the "malaria" before he had the ear trouble?

Intern: It was only a day or two.

Dr. Murphy: A day or two—meaning that he did not know. He was having fever with his suppurative otitis media, and that is why he had "malaria." You know "malaria" is like "rheumatism"—it covers many sins, as well as joints. It was metastatic osteomyelitis from the otitis media. I operated upon him some years ago. He had metastatic arthritis with bony ankylosis of the tibia and bony ankylosis at less than a right angle—at an acute angle. We performed a V-shaped resection, taking out a V-shaped piece of bone, swinging the leg around and wiring it in position. It discharged for a long time; the wire was finally taken out, and then it went on discharging a little until he got his acute attack and had complete bony ankylosis with this sinus in the center, so it was not osteomyelitis. His secondary infection was an arthritic infection—that is what I want to get clear. I recall that case very well. I operated upon him at the Alexian Brothers Hospital. I recall the case, because that was an exceptional operation for that time.

All these cases run similar courses. Every one of the joint infections, as well as every one of the bone infections, is merely a metastatic manifestation of an infection in some other position in the body.

We are going to make an exploration this morning and see what can be done. It is a question whether or not we should amputate the limb. It does not look like tuberculosis—it looks like caries. It is the sequence of his acute infection that he had eight months ago.

EXPLORATORY OPERATION

[Incision.] . . . You notice how cautiously I am working. See! There is the necrotic bone. I do not know what type of infection that is. We shall have cultures made. The leg must be amputated. That was just merely an exploration. I would not think of going on without his absolute consent in the presence of his people. You note I did not freshen any surface to give a new area of absorption. If I were to curet that now, I would give him a constitutional infection that would be fatal. If you are going to amputate, just let it alone. It must be amputated.

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Dr. Murphy (September 13, 1915): This is the case we had in on Friday. I shall ask the intern to read the history for the benefit of those who were not here on Friday. . . . That statement in the history is not correct. I did not remove a bony ankylosis of the tibia and fibula; I corrected the deformity and did an arthrodesis. That was not in the arthroplasty time. That operation was done in the Alexian Brothers Hospital many years ago, and the arthroplasty work was not begun until 1902. The patient had inflammation of the middle ear and suppuration of the middle ear with an opening and drainage. His condition improved after the drainage, but he then had a chill, with multiple arthritis, that led to a single joint ankylosis, notwithstanding that many joints were involved, as is commonly the case. That joint was opened and drained. That was the time for opening and draining of joints. When you open a joint and drain it after a suppuration, you agree with yourself and with the patient that one of the best results you can hope for is bony ankylosis. If you open a joint and wash it out with a 5 per cent. solution of phenol or aspirate the joint, or relieve the tension and keep injecting and aspirating, you can have preservation of motion if you put on a Buck's traction-apparatus. You can cut a joint wide open and wash it out and sew it up, but *do not leave in a drain.* Wherever you put in a drain in any serous-lined cavity you can satisfy yourself that the best thing you can expect is adhesion formation. That is not new. That was Fenger's method of treatment away back in 1885. The final story of this case is that the patient went along until he got an acute osteomyelitis several months ago. That destroyed the bone to such an extent that the limb cannot be preserved and amputation must be performed twenty odd years after the original correction of the deformity.

I looked over this bone on Friday and it is all excavated. There is nothing to cover this part any longer. It would be merely prolonged treatment without anything like the hope of a good result. Under these circumstances amputation is always an admission of defeat, and every doctor does it with great reluctance, but at the same time there is nothing else to be done here. In his original attack this was not osteomyelitis: it was metastatic arthritis with swelling of the knee and opening and drainage of the knee-joint, and then the patient was permitted to flex it at a right angle. His last attack was acute osteomyelitis.

SECOND OPERATION

I am going down to the muscular layer first. You see I am on the muscular aponeurosis. In the management of the bony stump there are two things that we have made an improvement in in amputations. The first is the management of the bone, and the second is the management of the nerve-stump, otherwise we have not made any special improvement in amputation. We needed both of these very badly. The number of neuromata that we have following amputations and the number of painful bone stumps are colossal. . . . Now I am down to the periosteum. Now we push the periosteum down off the bone and let it stay. Now I am pushing the periosteum downward off the bone so as to leave the end of the bone free from periosteum. That means what? That you will have a practically painless bony stump. It is the nerve-fibers in the periosteum that do the mischief.

Let the record show that the bone is sound.

Now you want to look for the nerve. That is what you must give close attention to now. Cut that nerve half-way across, then split it down to that point [indicating]. You take this end and, passing your needle through it, bring these axonal ends against the axonal ends of the upper ledge of that L-shaped division. Now put in just one more stitch. Now we shall fix our vessels. That forceps is put on the vessel. You put on two ligatures distal to that forceps. What are these put on for? The first is to traumatize the intima. The second ligature is after the plan of Senn. That double ligature gives the best result. Senn did not traumatize the intima proximal to the ligature. That is our plan. You can have suppuration of the stump and you can have the end of your artery ulcerate at your ligature, but you never have secondary bleeding. Why? Because you have fractured your intima and you have thrombosis within six hours, and you have it blocked above your ligature.

Now the two things we want to bring out in that amputation are first the removal of the periosteum for an inch above the site of removal of bone. The sensitive nerves run along for many inches in the periosteum and you cut them right off. That stops them from coming off and giving a painful stump. Immediately you have union of the soft parts to the bone surface and you do not have the sensitive bone-ends. In my own experience I think I have seen one case alone in which there was a spiculum of bone growing up in the stump. The second thing of importance is the management of the nerve-end, which I have already mentioned above.

Now I shall sew these muscle ends together as they stand up in the field. Now we approximate the skin. We have inserted a drainage-tube.

Postscript.—The tube was removed on September 17th.

CHRONIC EBURNATIVE OSTEITIS OF FEMUR —EXPLORATORY OPERATION

Summary: Clinical history of patient; comments—analysis of history; interpretation of skiagram; management of a case of sarcoma when diagnosis is in doubt; operation—dense eburnation of bone encountered—granulation tissue removed for examination; postoperative comments—correlation of clinical history with pathologic findings; pathologic report.

CLINICAL HISTORY OF PATIENT

A FEMALE, twenty-five years of age, was admitted to Mercy Hospital April 28, 1916. The family history reveals that the patient's grandfather died from epithelioma of the lip: there is no history of tuberculosis. The patient has always been healthy, is married, and has two children.

The patient complains of pain in the left knee-joint after walking, inability to extend the left leg upon the thigh unaided, and a slight swelling on the outer side of the left knee. On August 20, 1907, she stepped out of a buggy onto dry, rough ground with the left foot first: her ankle turned outward with the foot inverted, and she fell to the ground on the left side; she says her leg must have become twisted in some manner, because the left knee pained her as she lay there. The leg was extended. She was assisted to her feet and into a carriage, but was not totally incapacitated: the knee pained somewhat,—especially when she tried to walk,—but she was able to walk unaided. There was no swelling, and no chills or fever followed the injury.

During the week of the accident the patient did but little walking, on account of pain in the left knee when she thrust her weight on the left foot: she recalls that part of the time she had gone around the house with the left leg flexed at the knee, and the knee resting on a chair. There was no pain when kneeling, nor any when the leg was at rest. The knee gradually improved, and at the end of the week she had neither pain nor stiffness.

On December 25, 1908, the patient suddenly stooped over to pick something up from the floor, when the left knee seemed to give way; she had sudden pain in it, and fell to the left side with the left knee flexed. She was unable to straighten the left knee, and had to call in assistance: when it was finally straightened, no click was heard. There was no swelling, pain, or incapacity.

In July, 1909, while picking up some things from a table, the patient turned very quickly to the right, and had sudden severe pain in the left knee with a loud click that was heard 12 feet off; the left knee gave way, and she fell to the left upon the floor; the knee again became locked in flexion, and again some one had to straighten it; for one day she had slight pain on walking, but no noticeable swelling or redness. Since then she states that the knee has seemed to "bow inward" in a knock-knee position, with a slight swelling of the joint appearing below and to the inner side of the patella.

In the winter of 1911 the left knee began to pain, but not to the extent of incapacitating her: there was at no time any redness; she had no cough or cold, and her malady was diagnosed as "rheumatism." For about six months she wore an elastic bandage around the knee, but after two months the pain left and the swelling subsided almost entirely: there was no other treatment.

On November 15, 1914, the patient was thrown from a buggy, landing on frozen ground on her left side; she was able, however, to get up after the accident and walk about one-fourth mile; she had no pain at the time. The next morning she noticed on the outer side of the left knee a bruise, which was painful on pressure: there was no swelling, and she was not incapacitated; the soreness disappeared in one week.

During April, 1915, the left leg ached and the veins became enlarged: she was pregnant at the time. After confinement, in August, 1915, both the aching and the enlargement of the veins subsided.

In October, 1915, there appeared aching in the left leg from knee to ankle, while at night a severe throbbing pain radiated from the outer side of the knee to the ankle: frequently she was kept awake by the pain—especially if she had walked very much during the day. There was no redness. A physician diagnosed the condition as "an inflamed spot on the bone," and prescribed liniment, which, however, afforded no relief. The outer side of the knee became very tender. The trouble increased in severity, but did not incapacitate her: she had neither chills nor fever.

In January, 1916, a gypsum case was applied from middle of left thigh to middle of leg: during the time it was retained—two weeks—the patient had no pain except on pressure upon the outer side of the knee; when the gypsum case was removed, splints were applied for two weeks. The patient now usually walked with the aid of crutches, and the condition remained about the same as it was before. A skiagram taken at this time showed "an overgrowth of bone."

In October, 1915, the patient noticed for the first time inability to extend the knee by muscular action. For the last six months she has noticed a slight swelling on the outer side of the left limb, from above the knee to below it. She usually walks upstairs one step at a time, raising herself with the right leg, but is able to walk up in the usual way with but very little pain. The muscles seem to be weak.

Within the past three years the patient has lost 45 pounds in weight—most of this was lost during the past year.

Examination by Dr. Murphy (*April 25, 1916*).—The left leg is somewhat smaller than the right. There is a considerable amount of effusion in the joint. On the antero-external aspect of the femur there is a pronounced thickening, apparently involving the articular capsule (Fig. 255); this enlargement involves the entire external condyle, and extends upward along the shaft of the femur. The point of maximum tenderness is directly at the line of the articulation. The Wassermann test was negative. The tuberculin test was also negative. No Bence-Jones bodies were found. Examination of the urine was negative.

COMMENTS

DR. MURPHY (April 29, 1916): This patient's history discloses, first, the typic narrative of recurrent injuries with displacement of a semilunar cartilage: these manifestations occurred in 1908 and 1909, but since then have wholly subsided, and others have sprung up in their place.

The skiagram now reveals an area of compact consolidation of bone in the lower third of the femur: whether this is due purely to osteitis, to subperiosteal deposit beneath torn-off periosteum, or to sarcoma the sequence of the injury, is problematic; owing to the compact nature of the altered area of bone, however, I am inclined to doubt the diagnosis of sarcoma.

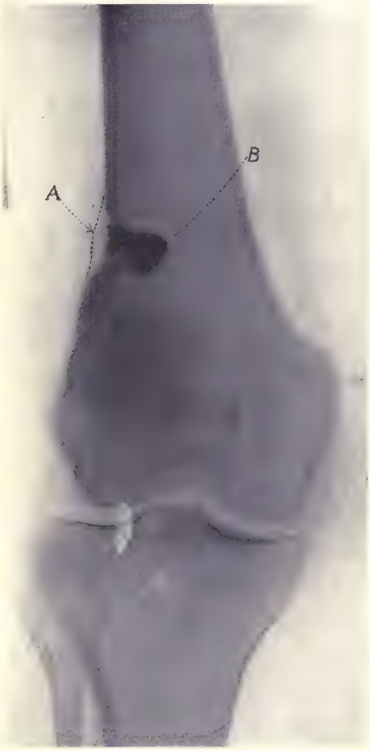

Fig. 255.—*A*, Outline of operative field of femur before operation; *B*, dark area shows iodoform in cavity of the bone. Note roughening of bone extending downward along external condyle.

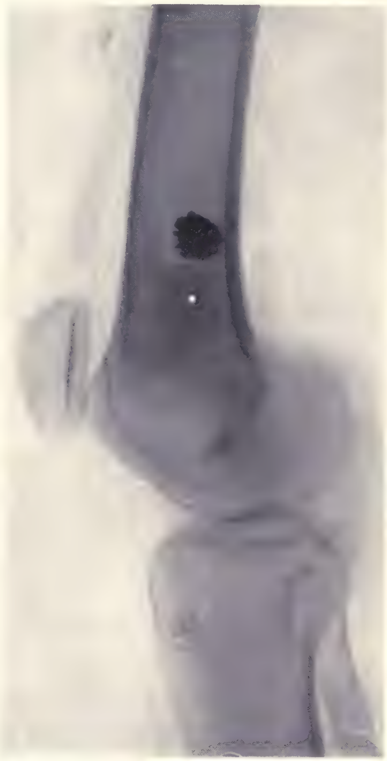

Fig. 256.—Iodoform-packed cavity in bone (lateral view).

Today we intend cutting down upon the diseased area of bone so as to examine it by direct inspection: we shall then decide whether or not to remove a specimen for microscopic examination. Should the lesion prove to be sarcomatous, the limb will be removed by high amputation through the thigh. We asked the patient if she would consent to an amputation while under the anesthetic in case we should find such a procedure indicated, but she withheld her consent; and we are inclined to feel that her stand was well taken, for I am loath to amputate in sarcoma on a frozen-section opinion alone, since one cannot always positively differentiate between granuloma and sarcoma in a frozen section, and therefore we prefer to await the final report. If it should be sarcoma, we had rather take the chance of its disseminating as the result of the irritation inaugurated by the removal of a specimen, than amputate on a questionable frozen-section opinion: to find out later that the report was incorrect would indeed be a terrible calamity.

OPERATION

[An incision was made along the external intermuscular septum, between the vastus externus muscle before and the biceps behind. On retracting the wound-edges, the bone was exposed and found to be densely eburnated. Some granulation tissue was removed and preserved as a specimen for examination. The resulting cavity was packed with iodoform powder and then closed.]

POSTOPERATIVE COMMENTS

These pathologic findings are in complete accord with the skiagraphic report, the clinical history, and the biologic tests: it was the dense compactness of the bone as revealed by skiagram and again by direct inspection that banished the thought of sarcoma from my mind. Newly formed bone—that is, slowly developing inflammatory bone—is always compact. We like hard bone. Hard bone results from either trauma with exostoses or from infection.

Pathologic Report.—The material consists of several fragments of bone—the longest of which measures 3 cm.—and soft tissue. Microscopic examination reveals granulation tissue, compact bone, and bone-marrow.

Postscript (May 14, 1916).—The patient is in very good condition. The wound healed *per primam.* On June 17th the internal semilunar cartilage was removed. This wound also healed by primary union.

GUNSHOT WOUND OF KNEE-JOINT WITH FRACTURE OF EXTERNAL CONDYLE AND SEMILUNAR CARTILAGE—REMOVAL OF BULLET-FRAGMENTS AND OF CARTILAGE

Summary: Clinical history of patient; comments—skiagram reveals bullet-fragments in knee: clinical history suggests in addition injury to a semilunar cartilage; operation—removal of bullet-fragments and of external semilunar cartilage; postoperative comments—after-treatment.

CLINICAL HISTORY OF PATIENT

A MALE, forty-seven years of age, was admitted to Mercy Hospital February 18, 1916. The family history is negative. Three years ago the patient had what was diagnosed pulmonary tuberculosis.

The patient complains of tenderness and slight swelling of the right knee with limited motion. Twenty-six years ago he received a gunshot wound about one inch above the head of the fibula: there was no wound of exit. He went to bed that night and had neither chill nor fever. The next day attempts were made to locate the bullet by probing, but without result (and, fortunately, he escaped infection). The wound of entrance was dressed with dry gauze, and three weeks later traction of *five* pounds weight was applied: this was maintained as long as the patient remained in bed (one week), and when he got up the leg was found to be slightly flexed; the wound shortly stopped draining, and was entirely healed in fifteen days.

During the year following the accident the patient walked with the aid of crutches and then a cane: during this time there were pain, slight swelling, and tenderness in the joint. From that time on the leg became straight, and the patient was able to bend it to a right angle.

Five years ago—in 1911—the patient twisted the right knee while bowling: there was slight soreness following the twist, but it soon subsided.

In November, 1915, the right knee was again twisted—this time while the patient was dancing: it remained sore five weeks, but did not force the patient to bed.

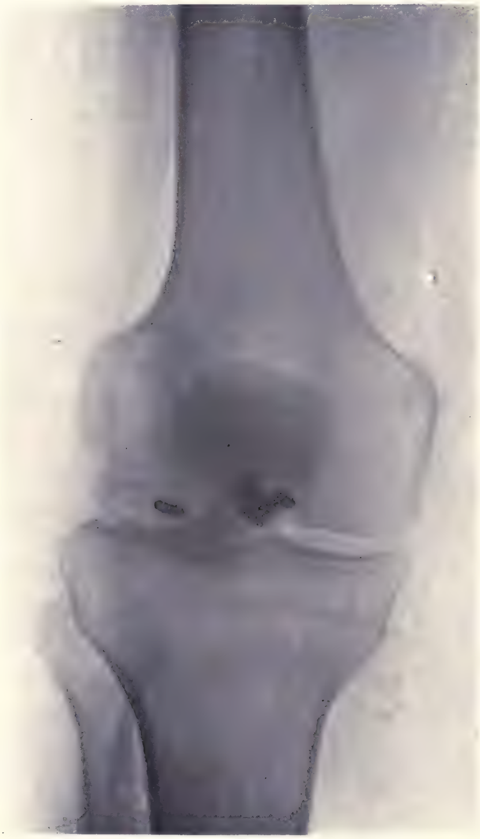

Fig. 257.—Preoperative skiagram orientating bullet-fragments in frontal plane. Note gunshot fracture of external condyle.

On February 5, 1916, the right knee was twisted for the third time, while the patient was walking: since then there have been marked pain, tenderness, slight swelling, and restricted motion of the joint.

COMMENTS

Dr. Murphy (February 19, 1916): The skiagram helps us out very materially in this case: the transverse view reveals two fragments of the bullet (Fig. 257)—the larger one is in the midline, just below the tip of the patella, and the other is just below it and to the right; the lateral view shows that both fragments are situated anteriorly (Fig. 258). The probabilities are that, in addition to the bullet-fragments, there is a split, frayed-out, or

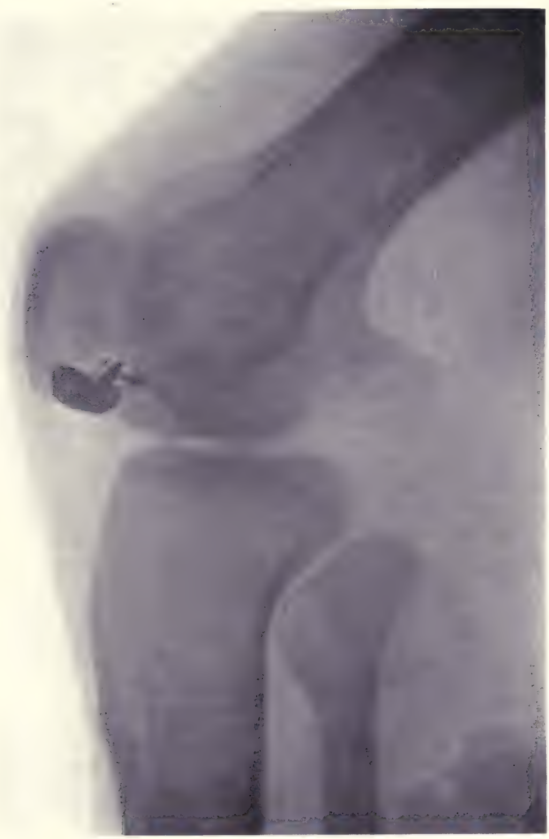

Fig. 258.—Preoperative skiagram orientating bullet-fragments in sagittal plane.

loosened semilunar cartilage that has been giving rise to the recurrent attacks of sudden pain and swelling in the joint.

OPERATION

[After opening the joint, attention was first directed toward the site of the bullet-fragments: the smaller fragment was removed first, and farther to the inner side the larger fragment was encountered, but was dislodged with difficulty, though finally removed. On further exploration it was found that the inferior articular surface of the external condyle had been fractured by the bullet, and that the external semilunar cartilage had been ground until it resembled a mass of fibrous *brie*. The external semilunar cartilage was ablated, and the wound was closed without drainage, the synovial membrane receiving a separate suture. The work was performed throughout without hand-contacting.]

POSTOPERATIVE COMMENTS

Buck's traction apparatus will be put on immediately and kept on four weeks. If pain or fever should arise, the joint will be injected with 2 per cent. formalin and glycerin.

Postscript (*March 24, 1916*).—There was primary healing of the wound, and the range of motion in the patella and knee-joint is the same as preceding the operation.

The following is an abstract of a case of "Bullet Wound of Knee" which was presented by Dr. Karl Connell on November 10, 1915, before the New York Surgical Society:

"A boy, fifteen years old, had been shot in the knee three months previously. The bullet was from a .38-caliber revolver at a distance of three yards, penetrating the left knee-joint. The missile entered lateral to, and above, the patella, traversed the outer condyle of the femur upward and backward, and lodged in the lower fourth of the shaft of the femur.

"On admission to the Roosevelt Hospital, service of Dr. Charles H. Peck, two hours after the injury, the boy's knee-joint was distended with blood and exudate. Dr. Connell opened the joint twenty-four hours after injury by five vertical incisions, exposing freely the superior, the two lateral, and the two posterior main pouches of the joint. These pouches were irrigated with weak iodin solution. The wounds were then closed without drainage by loose suture of the skin.

"The bullet itself was removed by separate incision, lifting the popliteal structures from the femur and chiseling a block from the shaft of the bone. The bullet was deformed and presented fibers of woolen cloth on its nose. This latter wound was packed wide open. . . . The incision to the bed of the bullet developed a putrefactive infection, such as is commonly seen with the low velocity débris-laden shrapnel bullets of Europe. However, this infection remained local and the joint itself remained uninfected. . . .

"Joint movement is now painless, the boy walks without limp, the traumatic synovitis has gradually subsided, and the knee flexes past the right angle."

Dr. Connell stated that the case was presented to exemplify a distressing type of injury commonly observed in his experience through the past winter in the war zone of France and the Central Empires. The case further exemplifies the wisdom of early and radical surgical cleansing of the knee-joint in wounds inflicted by low velocity débris-laden missiles.

SARCOMA OF LEG—AMPUTATION OF THIGH

Summary: Clinical history of patient; comments—course of tuberculosis or sarcoma when developing after trauma; citation of a similar case; operation—amputation of thigh by modified circular method; the proper disposal of periosteum, nerve-ends, and blood-vessels.

CLINICAL HISTORY OF PATIENT

A FEMALE, sixty years of age, was admitted to Mercy Hospital October 16, 1915. The family and past histories are negative.

In the fall of 1914, while going downstairs, the patient tripped, fell down two or three steps, and turned her right ankle under her: she tried to get up, but the pain in the ankle was so intense that she fainted and had to be carried to bed. The pain was intense for about one hour and then gradually eased up and the patient got out of bed. The ankle was stiff and hurt her when walking: she says that immediately after the fall it seemed to be swollen, and in twenty-four hours was black and blue. The swelling continued.

On the fourth day after the accident a physician applied a liniment and a tight bandage and told the patient to lace her shoe tightly over the ankle. She kept the bandage on for four months, and on removing it the ankle was still swollen: during these four months she had been walking around and doing her housework. She says that after the bandage was removed she began to have a dull ache with occasional sharp, shooting pains in the calf of the right leg.

In July, 1915, the patient again fell while going downstairs: she says that the right leg suddenly gave way under her without any apparent cause; she did not faint, and was able to get up unassisted. She says that she felt weak for the first time, but that the leg was not painful at the time of the fall.

From the time of the second fall the leg began to swell more rapidly, and the pain in the calf of the leg became more intense. The ankle was not painful, but there was a continual dull ache in the calf, with sudden, severe cramps, lasting from forty-five minutes to one hour, and worse at night: rubbing relieves these pains.

Walking gradually became more and more painful. The patient did her own housework up to October 1, 1915, when the leg became so painful that she had to go to bed. The ankle and the calf of the leg have been so sore that she has not been able to stand on the leg. Since October 1st she has noticed throbbing pulsations in the leg at times. She has had no fever or chills.

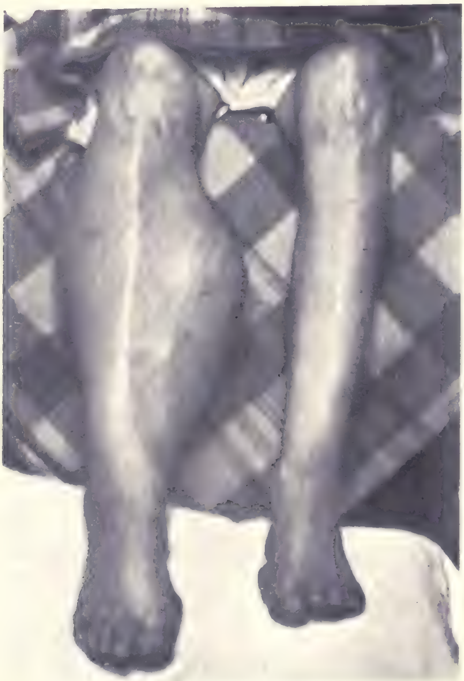

Fig. 259.—Sarcoma of leg as seen from before. Note distended veins over tumor.

During the past year the patient has lost from fifteen to twenty pounds in weight. She has a goiter, but has never suffered from it. She has never had any pain in the knee or hip.

Examination reveals a tumor the size of a cantaloupe in the calf of the right leg (Figs. 259, 260). The patient states that at the time of the second fall the leg was not one-half the size that it is now. The foot is extended and cannot be flexed. There is no local tenderness. The local increase of surface heat is very marked. The skin is under tension, but not markedly red. The superficial veins are not distended.

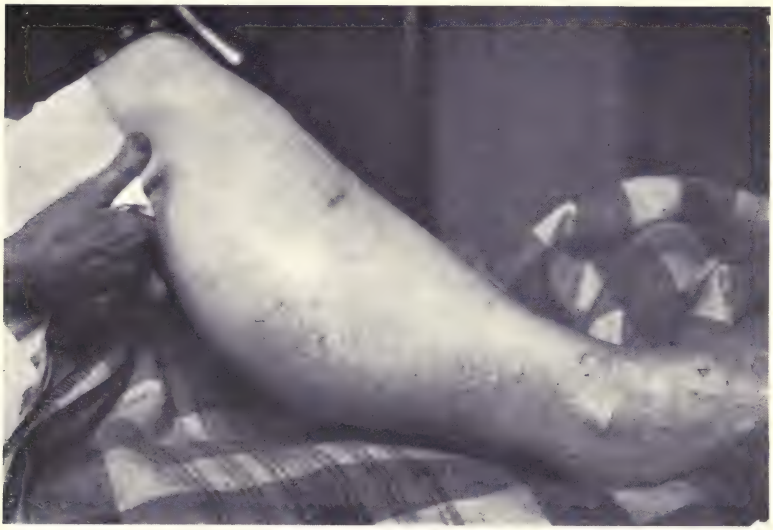

Fig. 260.—Sarcoma of leg as seen from side.

COMMENTS

Dr. Murphy (October 21, 1915): The salient feature of this patient's history is that, after the accident, the swelling subsided, but never entirely disappeared. In this type of cases there appear swelling and edema,—often a subcutaneous hemorrhage,—which persist for from ten days to three weeks and then subside almost to normal, *but never entirely disappear:* then comes the slowly increasing swelling as a sequence of the localization of the infection if tuberculous, and of the spreading of the malignant process, if sarcomatous.

The skiagram reveals the fact that the lesion does not involve either bone, but solely the soft structures. Sarcomata of the soft tissues in this region are rare, and yet we have had two examples in hospital within four weeks. One case occurred in a young girl: the gastrocnemius was involved, and we were able to remove the entire muscle, from its origin above clear down to where the tendon blends with that of the soleus to form the tendo Achillis; we succeeded in preserving the soleus muscle entire, as well as the internal and external popliteal nerves, so that now there is full function in the limb. For all practical purposes the soleus muscle has assumed the function of the gastrocnemius, but the soleus alone will not do the superlative work that is required of the gastrocnemius. (For complete report of this cited case consult Vol. IV, December, 1915, 1243–48.)

OPERATION

[The thigh was amputated by the modified circular method. The usual precautions were observed in dealing with the periosteum, the nerves, and the blood-vessels. The periosteum was removed from the bone for a distance of one inch above the saw-line, so as to prevent vicious hypersensitive proliferation from that source, resulting in a painful stump and adherence of the skin-cicatrix to the newly formed bone. The nerve-ends were trimmed in rectangular fashion and stitched recurved upon themselves, so as to prevent neuroma-formation and painful stump from this source. (See Vol. IV, October, 1915, 1008.) The blood-vessel ends were doubly ligated, one ligature being placed close to the end and the other one-half an inch proximally, and then proximal to the second ligature and proximal to this, the artery was traumatized by pinching it with a heavy hemostat, so as to fracture the intima and favor a thrombosis to the proximal side of the proximal ligature.] This was a method that I devised when I did my original arterial suture work in 1896. I have never seen a secondary hemorrhage since I put that in practice, so that, should the proximal ligature slip off, hemorrhage would still be prevented by the thrombus, which will have been formed between the two ligatures and proximal to the upper one within five hours. [A temporary drain was inserted, the muscles were quilted, the edges of the deep fascia apposed, and finally the subcutaneous tissue and skin.]

Pathologic Diagnosis.—Round-cell sarcoma.

The circular amputation seems to give the best results for the application of an artificial limb. Mummery, in his able article in the *British Medical Journal*, June 5, 1915, and Wright, in *The Lancet*, October, 1915, both show conclusively that the profession was not justified in abandoning the circular amputation, which had been in vogue for many years, for the rectangular or anteroposterior or internal or external flaps. The care of the nerve-end is a very important detail, as a sensitive neuroma is one of the most disagreeable conditions that can occur after an amputation.

The injection of saline into the femoral vein, as advised by Savariaud during the amputation, does not appeal to us. The subcutaneous injection during the operative work carried on after the plan of Lane or the intravenous injection through a needle, which we have used for so many years, we consider better means of sustaining the patient and causing a rapid reaction after the operation.

Postscript.—The wound healed *per primam.*

TUBERCULOUS TENOSYNOVITIS OF PERONEAL TENDONS—(1) INJECTIONS OF CALOT'S SOLUTION; (2) INCISION, EXCISION OF SYNOVIAL MEMBRANE, MAKING OF NEW SHEATH FROM FATTY TISSUE

Summary: Clinical history of patient; comments—nature of deformity present; grounds upon which diagnosis was established; injection of Calot's solution; operation—tissues found edematous from Calot's solution; sheath thickened, tuberculous granulations present; removal of granulation tissue sheath; fashioning of new fatty tissue sheath.

CLINICAL HISTORY OF PATIENT

A FEMALE, fifty-six years of age, was admitted to Mercy Hospital December 22, 1915. The family and past histories are negative.

The patient complains of pain and soreness in her right ankle when walking. On August 23, 1914, while carrying two buckets of water, the patient stepped upon a stick, turning her foot *outward* over the stick: she did not twist the foot completely over, nor did she fall; after turning her foot she stamped it, and says that it then felt as though it were torn apart—as though something had given way inside the foot. Still laden with the buckets of water, she walked the rest of the way home—a distance of nearly two blocks.

For three days after the accident the foot was neither painful nor tender, but at the end of that time it began to get both painful and sore on walking. Swelling began on the outer side of the right ankle, just below the malleolus, and this area seemed to be somewhat inflamed.

For the next three months the patient kept going about on her feet, and then went to a hospital for treatment: here a gypsum case was applied, and retained four weeks. After removal of the case, when the patient attempted to walk, the ankle became swollen and painful: she then took to bed.

In August, 1915, still unrelieved, the patient went to a different hospital: here the ankle was "injected" and rubbed with liniment; a gypsum case, too, was applied. While still in the hospital the patient fell, injuring her right foot: it was sore for about ten days, but the soreness gradually subsided.

During the past two weeks the patient has been walking a little, and the right ankle has gradually become more painful and tender.

COMMENTS

Dr. Murphy (January 10, 1916): This patient's foot presents a very peculiar picture. There is splendid motion in the ankle-joint. The foot itself is turned inward quite noticeably: one would think it fractured, but it is not. There is no general thickening of the joint, such as occurs with acute articular synovitis.

What two tendons pass downward behind the fibular malleolus? Those of the peroneus longus and brevis muscles, enclosed in their sheath. You may note a thickening corresponding to the course of this tendon-sheath.

From the minor nature of the accident, the chronicity of the lesion, and the anatomic location of the swelling, we should establish the diagnosis of peroneal tenosynovitis, tuberculous in origin, and sequential to trauma of the sheath when the foot was inverted. Occasionally tuberculous tenosynovitis involves the sheath of the tibialis posticus where it passes behind the tibial malleolus. This patient's ankle-joint has not been involved at any time, and therefore an injection into the ankle-joint was not indicated.

INJECTION OF CALOT'S SOLUTION

Today we are going to inject the peroneal tendon-sheath with Calot's solution, which, for this type of synovitis, is the best of all the preparations which have been recommended for injecting purposes. The composition of Calot's solution is:

Guaiacol, 2 parts; creosote, 2 parts; iodoform, 10 parts; olive oil, 100 parts. [Performs injection and then spreads the fluid throughout the tendon-sheath by massage: applies gypsum case.]

OPERATION (JANUARY 15, 1916)

[An incision was made along the malleolar course of the peroneal tendons: on opening their sheath the tissues were found edematous from the injection of Calot's solution; the sheath itself was thickened and contained tuberculous granulations and rice bodies. The tuberculous process extended fairly high along the course of the tendons, and within their sheath. The granulation tissue and synovial sheath were removed. Fatty tissue was obtained from the vicinity and wrapped about the peroneal tendons so as to form a new sheath and prevent adhesions, with consequent fixation of the tendons. The operative wound was closed without drainage.]

(A case of "Tuberculous Tenosynovitis of Palmar Synovial Bursa—Injection of Calot's Solution," was published in Vol. V, April, 1916, 295–99.)

Postscript.—The patient made an uneventful recovery and left hospital at the end of three weeks. She was instructed not to put too much weight on the foot for some time.

Pathologic Report.—Tuberculous tenosynovitis. There is abundant small-cell infiltration of the interfascicular tissue. No *B. tuberculosis* were seen.

SALINE PROCTOCLYSIS APPARATUS*

WITH A DESCRIPTION OF THE APPARATUS AS USED IN DR. J. B. MURPHY'S CLINIC

FIRST, Fowler position exaggerated at all times from the moment diagnosis is made.

Second, withhold all food.

Third, as soon as the patient is returned to bed after operation, proctoclysis is instituted and maintained until the serious symptoms of intoxication cease. The continuous method is by far the most scientific and successful. Moderate distention is the normal condition of the large intestine. If it is hyperdistended, it causes spasm and expulsion of material. The mucosa of the large intestine absorbs water with great rapidity. The retention of fluid in the colon depends entirely upon the method of its administration. We have visited hospitals numbers of times and have been shown patients who were receiving the "Murphy treatment." We should not have recognized it without the label. It is difficult to impress those administering it with the importance of details, notwithstanding that the best results are secured only by close attention to detail. A fountain syringe, to which is attached a three-eighths-inch rubber hose fitted with a hard-rubber or glass vaginal douche tip with multiple openings was the medium originally used by us. This tube should be flexed almost to right angles three inches from its tip (Fig. 261). A straight tube must not be used, as the tip produces pressure on the posterior wall of the rectum when the patient is in the Fowler position. The tube is inserted into the rectum on the flexion angle and secured in place by adhesive strips binding it to the side of the thigh, so that it cannot come out; the rubber tubing is passed under the bedding to the head or foot of the bed to which the fountain is attached. It should be suspended from six to fourteen inches above the level of the buttocks and raised or lowered to just overbalance hydrostatically the intra-abdominal pressure, *i. e.*, it must be just high enough to require from forty to sixty minutes for one and one-half pints to flow in, the usual quantity given every two hours. The flow must be controlled by gravity alone and never by a forceps or constriction on the tube, so that when the patient endeavors to void flatus or strain, the fluid can rapidly flow back into the can, otherwise it will be discharged in the bed. It is this ease of flow to and from the bowel that insures against overdistention and expulsion onto the linen.

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* From "Perforative Peritonitis, General, Free, Suppurative," by J. B. Murphy, *Surgery, Gynecology and Obstetrics*, June, 1908.

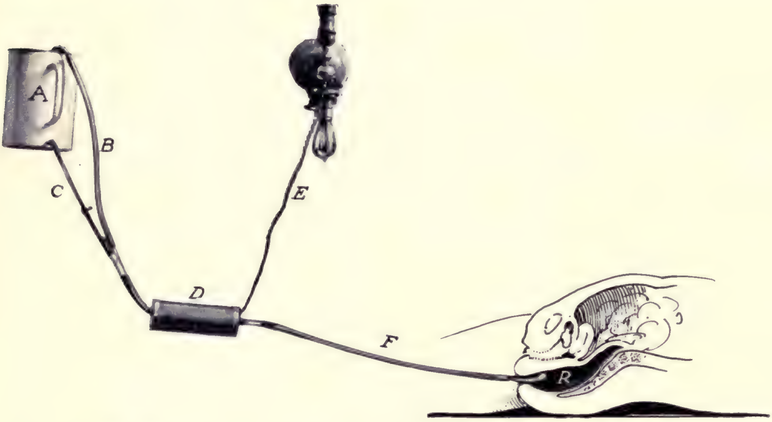

Fig. 261.—Dr. Murphy's proctoclysis apparatus in operation. *D*, An electric thermostat for keeping solution warm—a later modification.

The fountain had better be a glass or graded can, so that the flow can be estimated (Fig. 261, *A*). The temperature of the water in the fountain can be maintained at 100° F. by encasement in hot-water bags. The fountain is refilled every two hours with one and one-half to two pints of solution. The tube should not be removed from the rectum for two or three days, except for bowel movement. When the nurse complains that the solution is not being retained, it is certain it is not being properly given;

even children tolerate proctoclysis surprisingly well. We have administered as much as 30 pints of salt solution in twenty-four hours, and it was all retained. We believe that, next to the conservative technic of the operative procedure, proctoclysis is second in importance as a life-saver. It rapidly restores blood-pressure, it improves the capillary circulation, it quiets the thirst, it eliminates the septic products, and increases the excretions. All the details are simple, but they must be carried out with precision to secure the best results. If the patient has a tendency to vomit, is nauseated, or shows evidence of gastrectasis, lavage should be practised and repeated often if the stomach refills with fluid.

THE WRITINGS OF JOHN B. MURPHY, M.D.

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